Thank you for using EC5000 Series AC Motor Driver. EC5000 Series products adopt the high-quality components and materials, manufactured with the latest microcomputer control technology.

This manual describes the matters relevant to the installation, parameters setting, abnormality diagnosis and solution, and the daily maintenance of the AC motor driver that need attention of the users. In order to ensure the correct installation and operation of the motor driver, please carefully read this manual before the installation, properly keep it and give it to the machine users.

AC motor driver is a precise electric and electronic product, thus for the safety of the operators and the equipment, please ensure that the installation and parameters adjustment is done by professional motor engineers, and the content marked as "Danger", "Notice", etc in this manual must be read carefully. If you have any questions, please contact with the agents of our company, and our technicians are ready to serve you.

The matters that specially need attention are as follows:

Danger!

1. The power supply must be turned off when laying the wires.
2. When the AC power supply is cut off but the indicator light of the manipulator of AC motor driver is still on, there is still high voltage in the AC motor driver which is very dangerous, please do not touch the interior circuit and components.
3. Do not modify the interior components or circuit of AC motor driver by themselves.
4. Do not connect the output terminals of AC motor driver U/T1, V/T2 and W/T3 with AC power supply.
5. The terminal of AC motor driver must be grounded correctly.
6. This series of AC motor drivers can't be used for the occasions related to personal safety, e.g. the life maintaining equipment.

Warning!

1. Please do not test the voltage resistance of the interior components of the driver, as the semiconductor of the driver is easy to be punctured and damaged by high voltage.
2. The circuit board of the driver has CMOS IC which is extremely easy to be damaged by static electricity, thus please do not touch the circuit board with your hand before taking anti-static electricity measures.
3. Even if the motor is inactive, the main loop terminal of the driver may still have dangerous high voltage.
4. Only the qualified motor professionals can install the driver, lay the wire, repair and maintain the driver.

Notice!

1. When certain functions of the driver are set, the motor may immediately start after the power input.
2. Please choose a safe place to install the AC motor driver to avoid the high temperature, direct sunlight, humidity and splash of water drops.
3. Please prevent the children or irrelevant people against being close to the AC motor driver.
4. The AC motor driver can only be used in the places recognized by our company, and the usage in an environment not recognized by our company may lead to fire, gas explosion or electrification.
5. When the wire between the AC motor driver and the motor is too long, the inter-layer insulation of the motor may be damaged, please use the special AC motor for AC motor driver, or add a reactor between the driver and the motor to prevent the AC motor from being burned due to the damage of insulation.
6. The rated voltage of the power system for the driver can't be higher than ±15% of the rated voltage of product, and the current can't be over 5000A RMS (The current of 40HP (30kW) type or above can't be over 10000A RMS).

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1.1Delivery Inspection

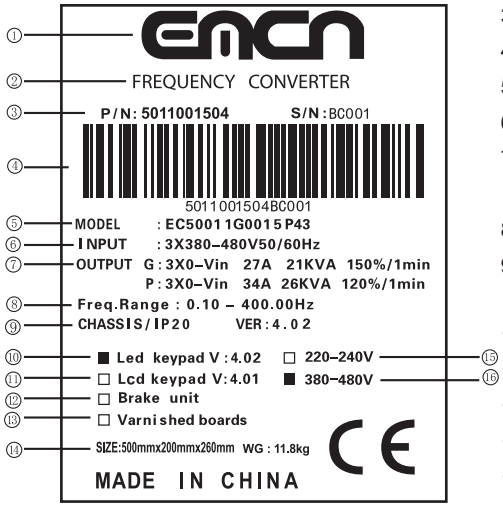
Every EC5000 AC motor driver has undergone strict quality management before delivery, and been packed to enhance its collision resistance. The customer should immediately carry out the following inspection steps after unpacking the AC motor driver.

■Check whether the AC motor driver is damaged during the transportation.

■Check whether the type and model of the AC motor driver are consistent with the information on the package.

For any inconsistency between the received product and your order,or any problem of the product, please contact with our agents or distributors that sold you the product.

Description of the nameplate of package



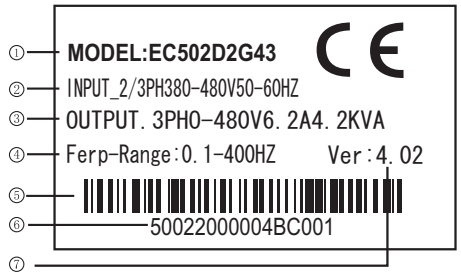
1. Trademark of product
2. Name of product
3.Serial number of production control
4. Barcode
5. Model of product
6. Specification of input power supply
7. Specification of output power supply
8. Range of output frequency
9.Protection grade, version of mainboard
10. LED manipulator
11. LCD manipulator
12. Interior brake unit
13. Painting of circuit board
14. Dimensions of exterior package, total weight
15. Specification of 220V voltage
16. Specification of 380V voltage

Notice!

The 10~17 of nameplate, ■is product configuration

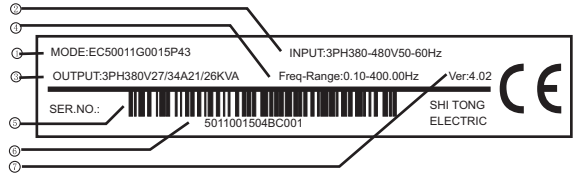
Description of the nameplate of product

EC500D4G23~EC503D7G43

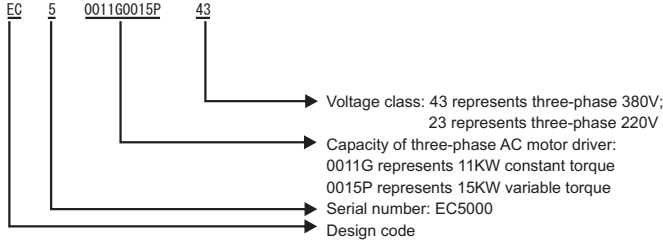


1. Trademark of product
2. Specification of input power supply
3.Specification of output power supply
4. Range of output frequency
5.Barcode
6.Serial number of production control
7.Motherboard version

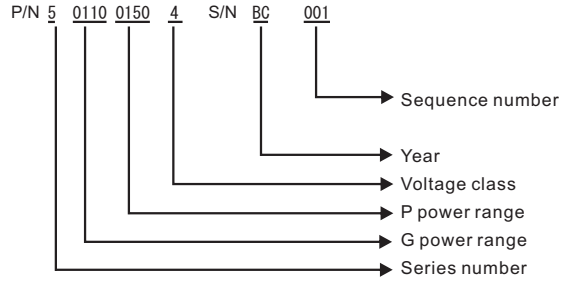
EC505D5G07D5P43~EC50315G03505P43



Model Description

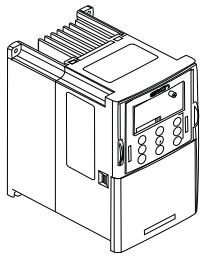

EC 5 0011G0015P 43
Voltage class: 43 represents three-phase 380V;
23 represents three-phase 220V
Capacity of three-phase AC motor driver:
0011G represents 11KW constant torque
0015P represents 15KW variable torque
Serial number: EC5000
Design code

Description of Serial Number

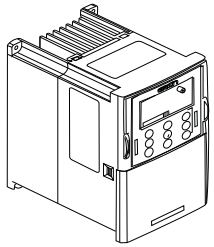


1.2Appearance of the Product

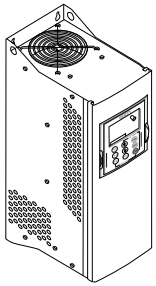
EC500D4G23、EC50D75G23
EC50D75G43、EC501D5G43(Frame 10)



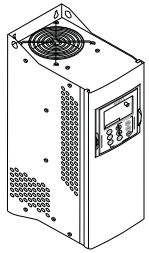
EC501D5G23、EC502D2G23
EC502D2G43EC503D7G43(Frame 11)



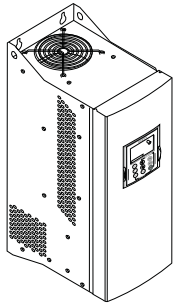
EC505D5G07D5P43、
EC507D5G0011P43(Frame 20)



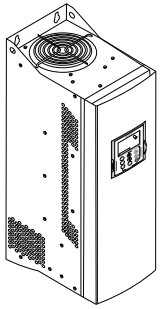
EC50011G0015P43、
EC50015G18D5P43(Frame 30)



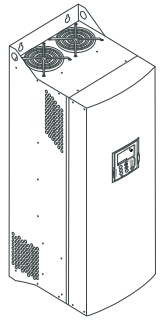
EC518D5G0022P43、
EC50022G0037P43 (Frame 40)



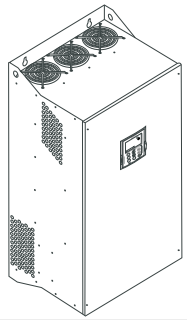
EC50030G0037P43、
EC50037G0045P43(Frame 50)



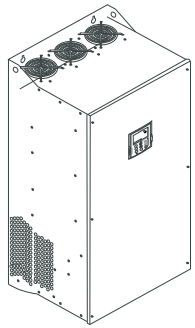
EC50045G0055P43、
EC50055G0075P43(Frame 60)



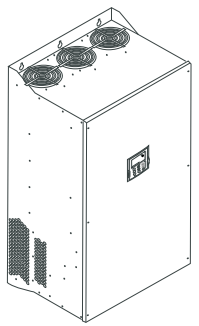
EC50075G0090P43、
EC50090G0110P43(Frame 70)



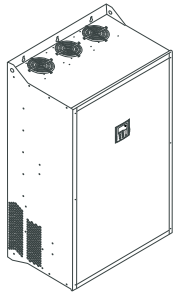
EC50110G0132P43、
EC50132G0160P43(Frame 80)



EC50160G0185P43、EC50185G0220P43、
EC50220G0250P43(Frame 90)



EC50250G0280P43、EC50280G315P43、
EC50315G0350P43 (Frame A0)



1.3 Transport

This product is a precise device, please handle it with care during the transport, prevent it from severe collision.

1.4 Storage

This product must be in the packing box before installation. If it won't be used for a period, in order to keep it within the warranty scope of our company and for the future maintenance, the following matters must be paid attention to for the storage:

√ The product must be put in a dust-free and dry place.

√ The temperature of the storage place must be -20℃+60℃.

√ The relative humidity of the storage place must be 0%-95% without frost.

√ Avoid putting the product in an environment with corrosive gas or liquid.

√ It is better to put the product on a shelf or stand with a proper package.

Notice!

1. Even if the humidity meets the requirements of the criterion, if the temperature changes quickly, moisture condensation or icing may also happen, thus the product should not be stored in such place.

2. Do not put the product directly on the ground, but on a proper stand. If the surrounding environment is very bad, desiccant should be put in the packing bag.

3.When the storage period is longer than 3 months,the surrounding temperature should not exceed 30℃, because the electrolytic condenser is stored with power off, and it will easily degrade if the temperature is high.

4.When the AC motor driver is installed in the installation or control panel but isn't used, especially in the construction sites or the wet places with lots of dust, the AC motor driver should be removed and put in a proper environment satisfying the storage requirements mentioned above.

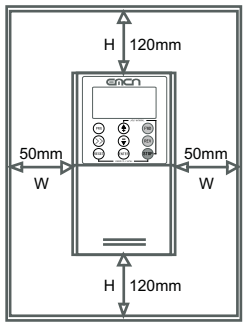
5.The electrolytic condenser is easy to degrade with power off for a long term. Please do not store the electrolytic condenser with power off for more than one year.

2.1 Installation Environment

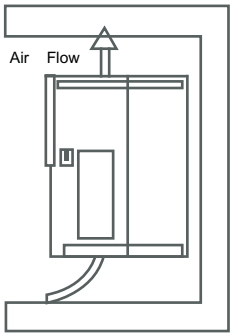
Please install the AC motor driver in the following environment to guarantee the usage safety of the product:

Operating Environment	Ambient temperature Relative humidity Pressure Installation height Vibration	-10 ~ +50°C (14 ~ 122°F) for UL & cUL without anti-dust cover <90%, without frost 86 ~106 kPa。 <1000m。 <20Hz: 9.80 m/s²(1G) max 20~50H:5.88 m/s² (0.6G) max。
Storage and Transport Environment	Ambient temperature Relative humidity Pressure Vibration	-20°C ~ +60°C (-4°F ~ 140°F)。 <90%, without frost 86 ~ 106 kPa。 <20Hz: 9.80 m/s² (1G) max 20 ~ 50Hz: 5.88 m/s² (0.6G) max。
Degree of Pollution	Class 2: suitable for factory environment	

2.2 Conditions for Installation



(A)



(b)

■The AC motor driver should be installed vertically with bolts on a solid structural body; upside-down, angled or horizontal installation is not allowed.

■The AC motor driver will generate heat during its operation, for the Design should be in accordance with Figure (b) to ensure the flow of cooling air.This design has certain space for the generated heat to emit upwards, therefore, and do not install the driver below the equipment unable to tolerate heat.

■The temperature of the cooling plate will be close to 90℃ during the operation of AC motor driver, therefore, the back of the AC motor driver shoulduse the heat-proof material.

■When the AC motor driver is installed in the control panel, the ventilation and heat emission should be considered to ensure the ambient temperature of the AC motor driver won't exceed the limits. Do not install the AC motor driver in an airtight box with bad ventilation and heat emission.

■When several AC motor drivers are installed in one control panel, it is recommended to install them abreast to avoid their mutual heat impact. If they have to be installed vertically, there should be division plates to avoidthe impact caused by the heat generated below to the upper drivers.

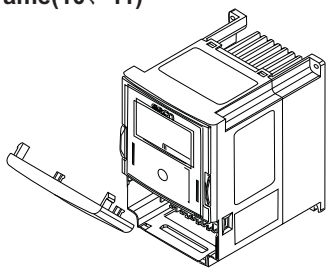
Notice!

1.Please do not let the foreign matters e.g. fibers, scraps of paper, wood chips or metal fragments enter into the AC motor driver or be attached to the cooling fan.

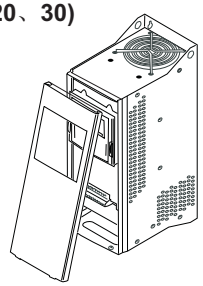
2.The AC motor driver should be installed on an incombustible structure such as metal, or else fire may be caused.

2.3 Remove cover schematic drawing

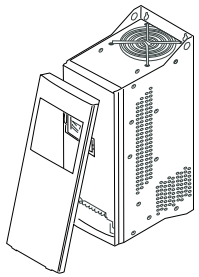
Frame(10、11)



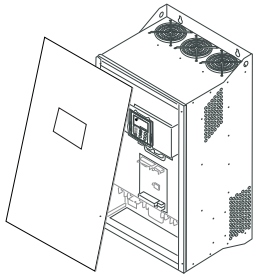
Frame(20、30)



Frame(40、50、60)

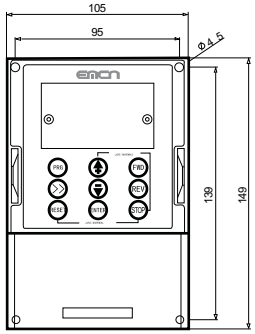


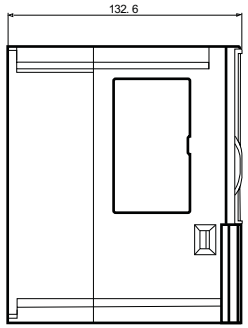
Frame(70、80、90、A0)



2.4 Installation dimension of AC motor driver

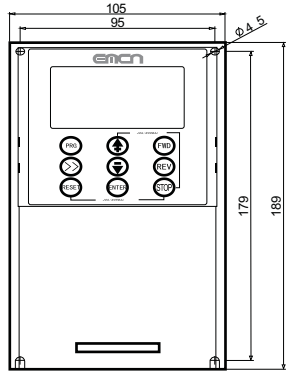
Frame10：EC500D4G23、EC50D75G23、EC50D75G43、EC501D5G43

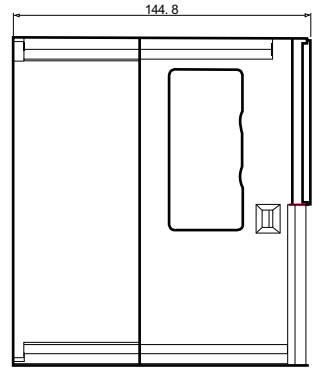




unit:mm

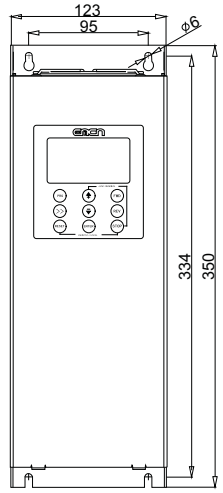
Frame11：EC501D5G23、EC502D2G23、EC502D2G43、EC503D7G43

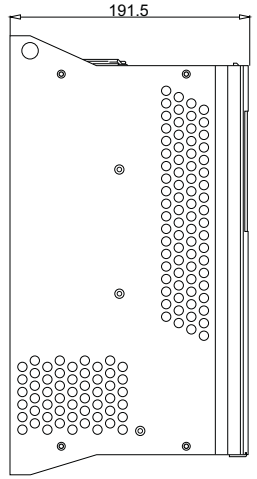




unit:mm

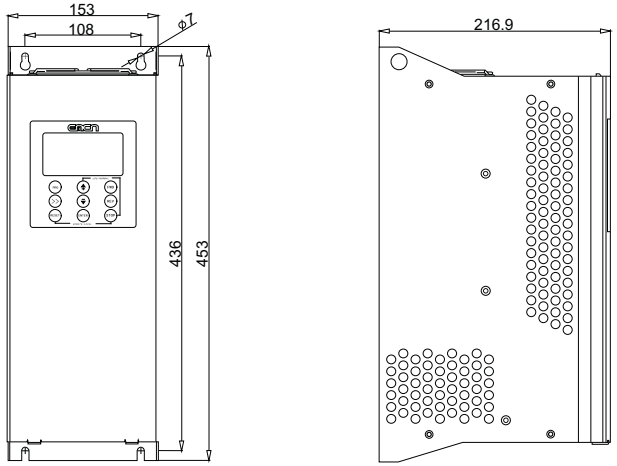
Frame20：EC505D5G07D5P43、EC507D5G0011P43





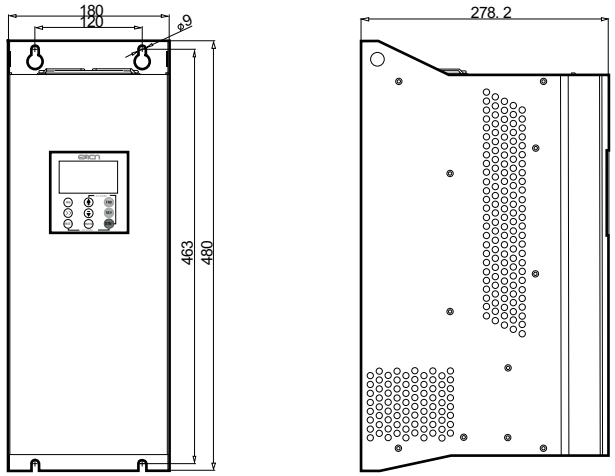
unit:mm

Frame30:EC50011G0015P43、EC50015G18D5P43



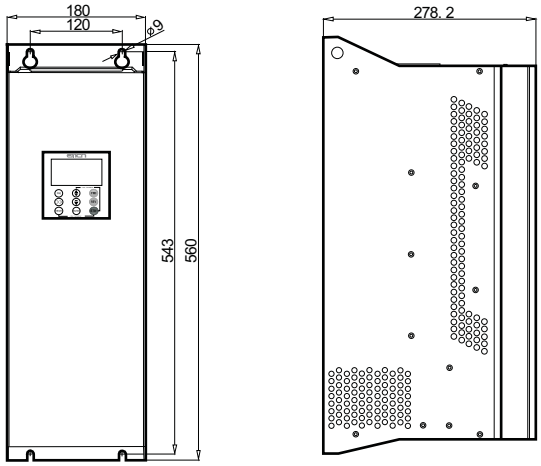
unit:mm

Frame40：:EC518D5G0022P43、EC50022G0030P43



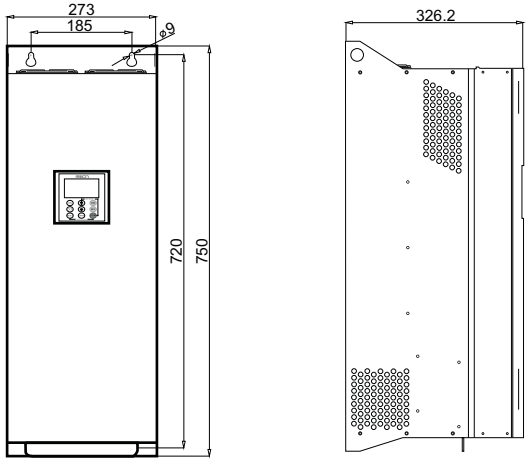
unit:mm

Frame50:EC50030G0037P43、EC50037G0045P43



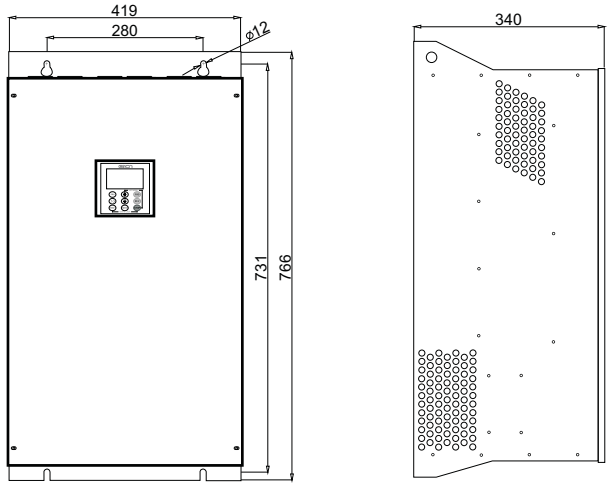
unit:mm

Frame60：:EC50045G0055P43、EC50055G0075P43



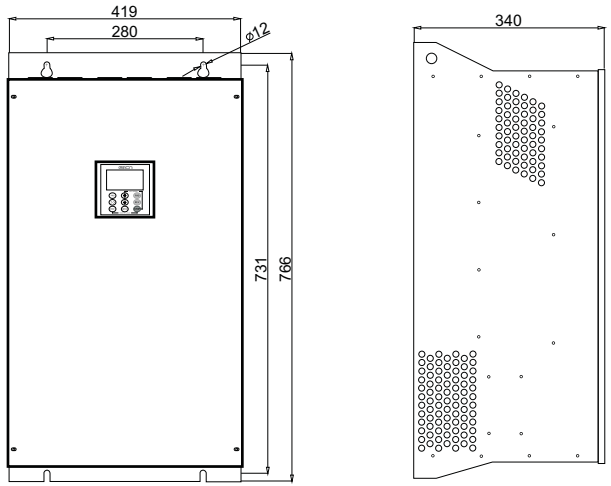
unit:mm

Frame70:EC50075G0090P43



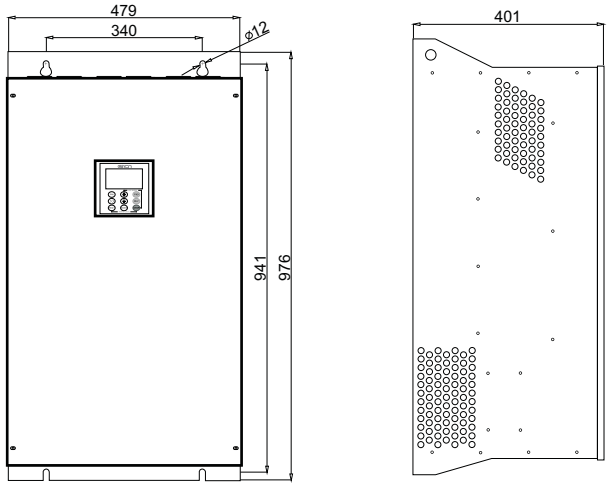
unit:mm

Frame70: EC5090G0110P43



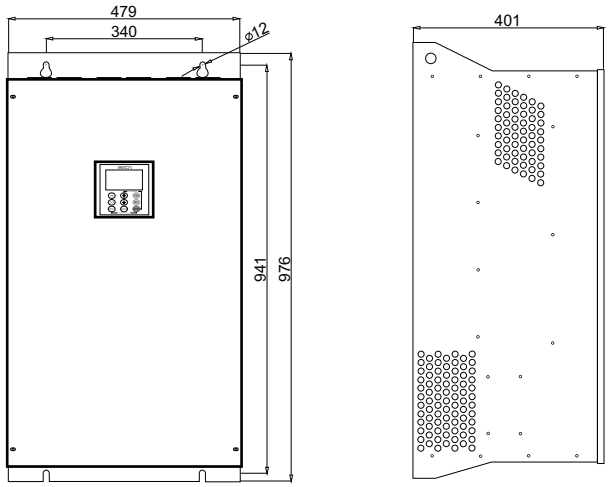
unit:mm

Frame80:EC50110G0132P43



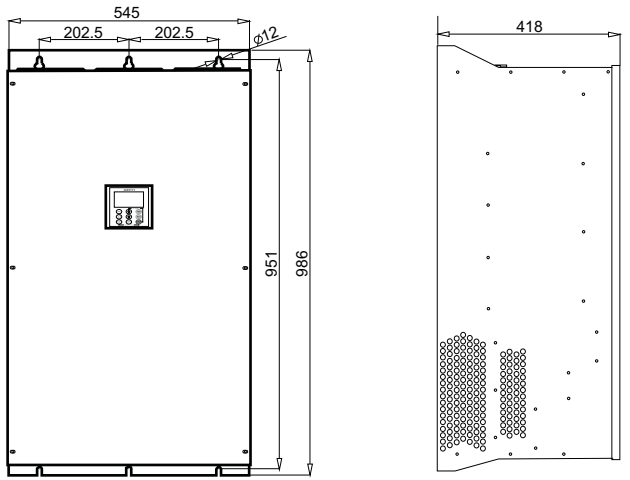
unit:mm

Frame80:EC50132G0160P43



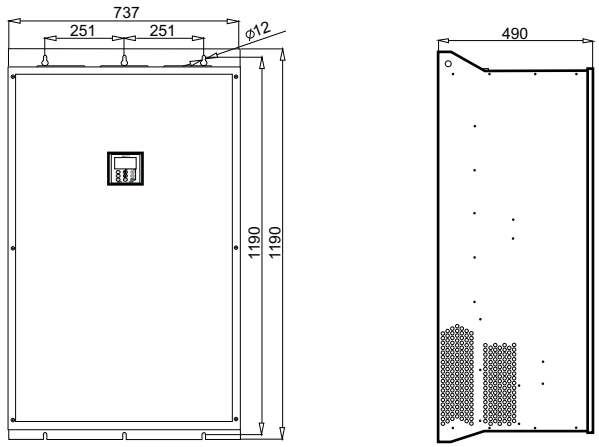
unit:mm

Frame90:EC50160G0185P43、EC50185G0220P43、EC50220G0250P43



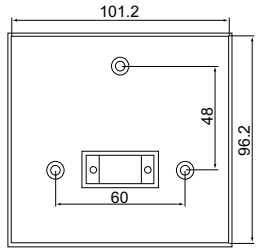
unit:mm

FrameA0：EC50250G0280P43、EC50280G0315P43、EC50315G0350P43



unit:mm

Dimension of the installation hole on the external frame of operation panel



Installation Hole Size: 101.2mm*96.2mm unit:mm

2.5 Instruction for Wire Layout

After removing the upper cover, the connection terminal strips are exposed, check whether the terminals of main loops and control loops are marked explicitly and pay attention to the following instructions during connection, do not make improper connections.

2.5.1 Basic Wire Layouth

■The power supply must be connected with the terminals of the main loops of AC motor driver S/L2, T/L3. If the power supply is improperly connected with other terminals, the AC motor driver will be damaged. Besides, check whether the voltage/current of the power supply is within the allowable range indicated on the nameplate.

■The grounding terminals must be grounded well, on the one hand it can prevent electric shock or fire, and on the other hand it can reduce the noise interference.

■ Connect the terminals with wires,ensure the high reliability of the connection.

■ After finishing the wire layout, check the following:

1. Are all the connections correct?
2. Is there any connection left out?

3.Is there any short circuit or line-to-ground short circuit between the terminals and the connecting wires?

When the power is on, if the connections need to be changed, first the power supply should be turned off, and the filter capacitor of the DC part of the loop will need some time to discharge electricity. The work can only begin after the completion of electricity discharge. Besides, due to the residual voltage, sparks may be generated when there is a short circuit, thus it's better to conduct the work under voltage-free conditions.

Notice!

1. Grounding wire must be connected, or electric shock or fire may happen.
2. The wiring work should be done by the professional technicians.
3. Start the work after confirming that the power is off, or electric shock may happen.

Basic Wire Layout Graph

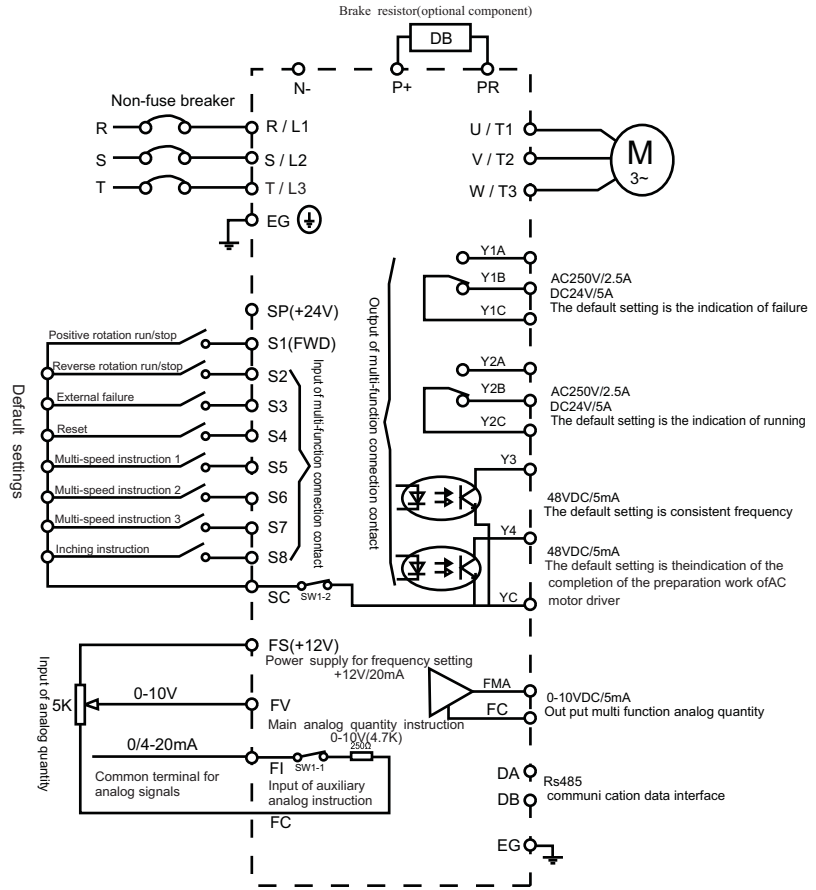
The wires of AC motor driver can be divided into main loop and control loop. Users can open the upper cover and see the terminals of main loop and control loop. Users must lay the wires according to the figure below to ensure the accuracy of connections.

Notice!

During the wiring, the selection of the specification of wire diameter should be in accordance with the standards of electrical engineering for safety. The screws of the terminals should be tightened, preventing the sparks caused by loose screws due to vibration. The standard wire layout figure for EC5000 AC motor driver is shown below.

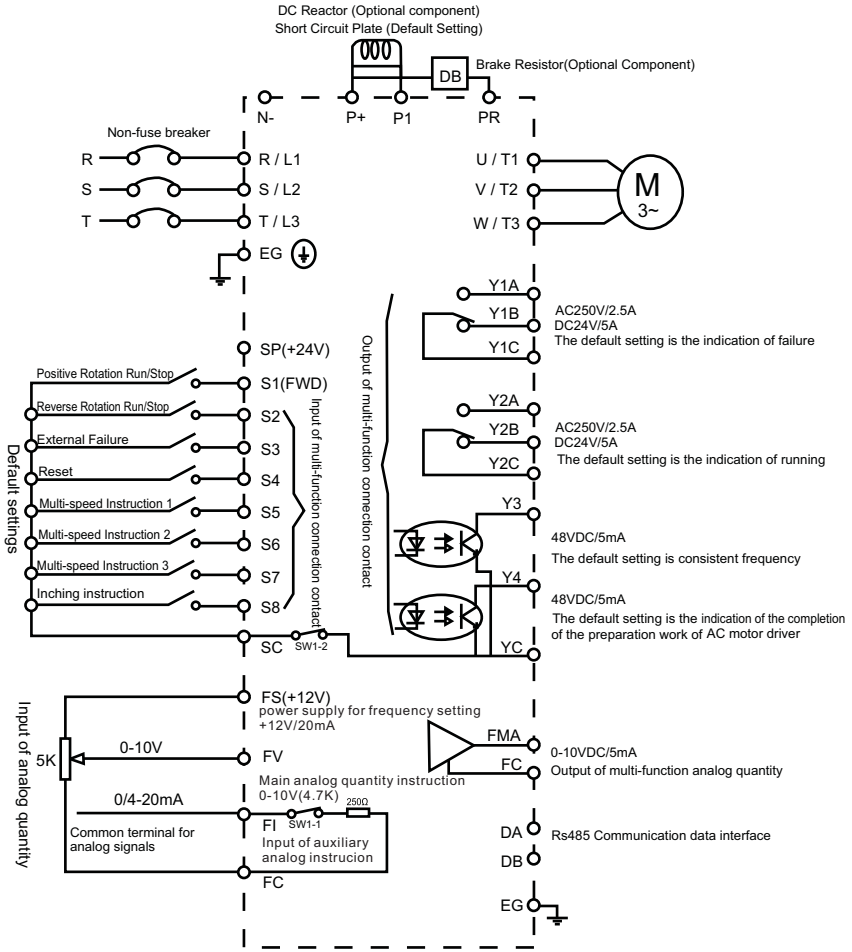
Wire layout figure 1

EC500D4G23~EC502D2G23、EC50D75G43~EC503D7G43



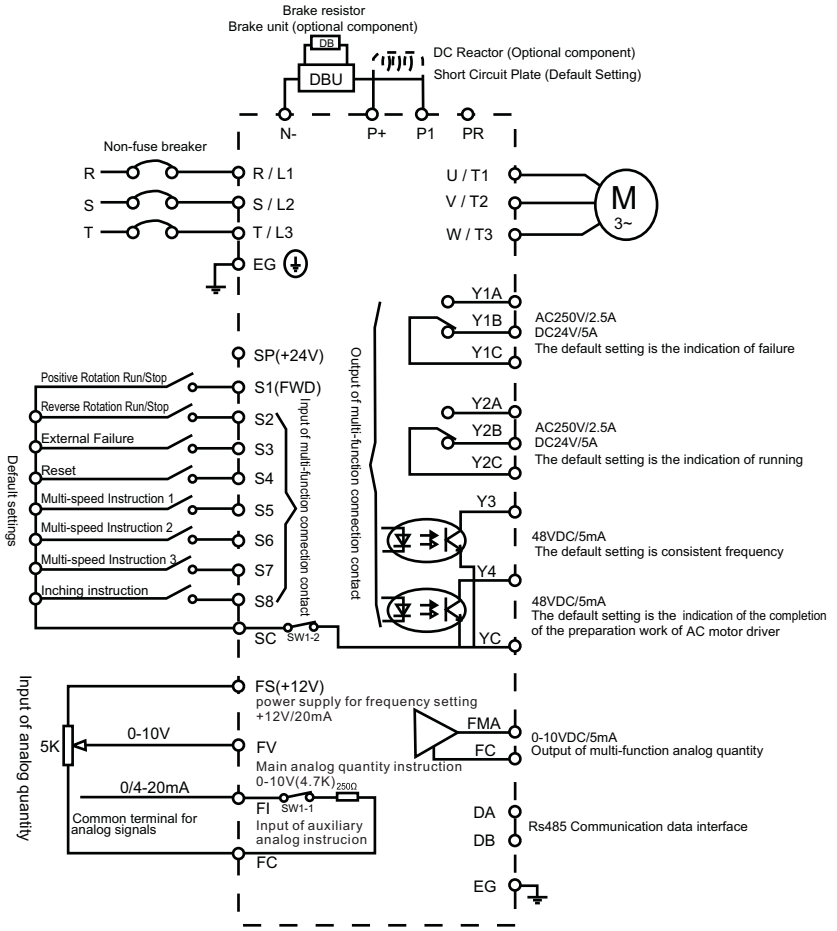
Wire layout figure 2

EC505D5G07D5P43~EC50015G18D5P43

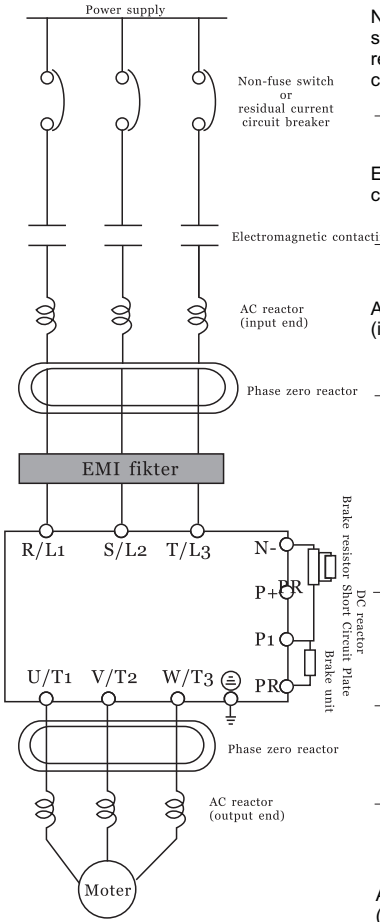


Wire layout figure 3

EC518D5G0022P43~EC50315G0350P43



2.5.2 Wire Layout of the System



Powersupply	Please use the power supply in accordance with the rated specification in the usage manual.
Non-fuse switch or residualcurrent circuitbreaker	The input current may be heavy when the power is turned on. Adopt a proper non-fuse switch or residual current circuit breaker.
Electromagnetic contactor	Please do not use the electromagnetic contactor as the power switch of AC motor driver, since it will shorten the service life of AC motor driver.
ACreactor (inputend)	When the output capacity is over 1000kVA, it is recommended to add an AC reactor to improve the functional factor. The distance of wires should be within 10m.
Phase zeror eactor	Used for reducing the radiation interference, especially in the places with audio devices, and reducing the interference of input end and output ends as well. The effective range is AM wave band -10MHZ.
EMI filter	Used for reducing electromagnetic interference. Please refer to the annex.
Brake resistor	Used for shortening the decelerating time of motor. Please refer to the annex.
AC reactor (output end)	The length of motor wires will influence the magnitude of the reflection wave on the motor end. When the engine wires are longer than 20m, it is recommended to install the AC reactor. Please refer to the annex.

2.5.3 Connection of the Main Loop Terminals

Description of the Main Loop Terminals

No. of Terminal		Description
R S T	R/L1 S/L2 T/L3	Input end of commercial power supply (single-phase/3-phase)
U V W	U/T1 V/T2 W/T3	AC Motor drivers output connected with 3-phase inductionmotor
P_1, PR	P_1 PR	⩽15KW with brake component which is connected to terminal P1,PR.To improve the brake moment of force, an ourside brake resistance is needed.
P_1, N-	P_1, N-	Machinery⩾18.5KW install drive circuit without outside braking resistance component. To improve braking power, ouside braking resistance and braking component is necessary(both are optional)
P_1, P_+	P_1, P_+	Connect DC reactor to improve power factor, reduce the DC bus AC pulse
EG	EG	For safty and small noise' AC motor drivers ground terminal EG should be well grounded.

General matters of main loop wires that need

■ The AC power supply must not be connected to the output terminals of AC motordriver d W/T3.

■ Ensure that the screws of the main loop terminals are tightened to prevent the sparks caused by the loose screw due to vibration.

■ The wires of main loop and those of control loop must be separated to avoid misoperation. If an intersection is needed, make them intersect with a right angle.

■ It is best to use the shielding wire or wiring tube as the wires for power supply, and make insulation layer or the two ends of the wiring tube grounded.

■ If the installation place of the AC motor driver is extremely sensitive to interference, please add an RFI filter in a place with a distance from the AC motor driver as close as possible. The lower the carrier frequency of PWM is, the less the interference there will be.

■ When the AC motor driver is equipped with a residual current circuit breaker for the protection against electric leakage, please select the ones with action current over 200mA and action time over 0.1s to avoid the misoperation of residual current circuit breaker.

■ The AC motor driver, motor and wires will cause noise interference. Pay attention to the surrounding sensors, and check whether there is misoperation of the equipment to prevent the accidents.

Description of the power supply input terminals of the main loop (R/L1S/L2，T/L3)

■ Ascertain the voltage of power supply and the maximum current that can supply.

■ Main loop terminal R/L1, S/L2, T/L3 is connecting to a three-phase AC power through the circuit (wiring) protection with circuit breakers or earth leakage protection circuit breakers, without considering phase sequence connection

■ To cut off power and avoid accident when AC motor driver protection power is on, electromagnetic contactor to connecting to the circuit is necessary. (The two ends of the electromagnetic contactor should be equipped with R-C surge absorber).

■ Don't use main loop ON/OFF switch to start and stop AC motor driver. Use loop control terminal FWD, REV or RUN/STOP button on the control panel to start and stop AC motor driver .If you must use main power supply ON/OFF switch to start and stop, do it no more than 1 time within one hour.

■ Do not connect the 3-phase power supply machine with the single-phase power supply.

Output terminals of AC motor driver(U/T1. V/T2. W/T3)

■ Connect AC motor driver output terminal to 3 phase motor according to correct phase order. If motor rotates in wrong direction, change any 2 phase of U V W

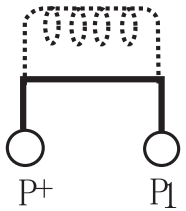
Positive rotation

■ The output terminal of AC motor driver can't be connected to the inlet phase capacitor or surge absorber. If the wires are very long, it should be connected with the AC reactor on the output end.

■ There is high frequency current in the extra long wire between motor and AC motor driver. This may cause AC motor driver over flow and stop. Besides, long wire increase leaking current, this leads to poor precision of current value. AC motor driver≤3.7KW choose wire less than 20 meters to motor, less than 50 meters for AC motor driver over 3.7 KW. If the wire is very long a wave filter connected to the output side AC reactor is necessary

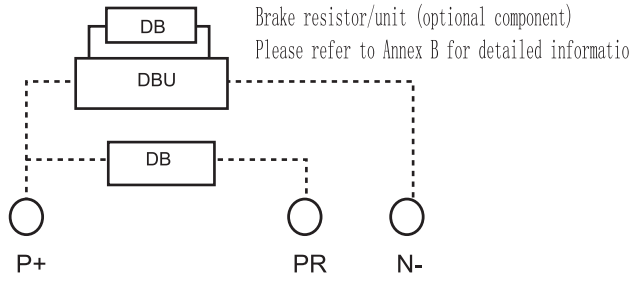
■ Used insulation strengthened motor

Connection terminals of DC reactor [P，P1]



DC reactor short circuit plate

The connection terminals of the external brake resistor [P,PR] and the connection terminals of the brake unit [P+, N−]



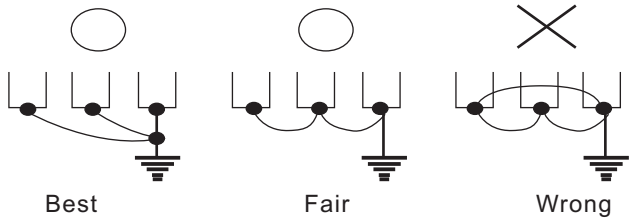
Grounding terminals of AC motor driver (EG)

■ For safety and noise reduction, the grounding terminals of AC motor driver should be well grounded.

■ The grounding wire of AC motor driver can't be grounded together with the machines with heavy current load e.g. the electric welding machine and high power motor, they should be grounded separately instead.

■ In order to prevent electric shock and fire, the external metal grounding wires of electric equipment should be wide and short, and connected to the special grounding terminals of the AC motor driver system.

■ When several AC motor drivers are installed together, all the AC motor drivers should be directly connected to the shared grounding terminal. Please refer to the following figure and ensure that there is no loop between the grounding terminals.



2.5.4 Control Terminal connections

Sort	symbol	Terminal name	Function
Simulate value input	FS	potentiometer power	potentiometer power（+12VDC）for setting frequency（1～5kΩ）
	FV	Voltage input setting	1. Frequency set by an external analog input voltage command value ① 0～10V DC/0～100%。 ② anti action：+10V～0V DC/0～100% 2. Input PID target control signal, input impedance:20kΩ
	FI	Current input	1. Frequency set by an external analog input current / voltage command value① 4～20mA DC/0～100%。 ② 0～10V DC/0～100%（set Sw1 to OFF）。 2. Input PID feedback control singal, input impedance:250Ω
	FC	Simulaged public terminal	Public terminal of simulated input signal.
Joint input	S1	Positive rotation/stop	Terminal S1-SC: ON: Positive rotation run OFF:low down and stop
	S2	Multifunction input2	Terminal S2～S8 is functional for motor free rotation, outside alarm, alarm resume,multi-pace frequencysignal. For more detail, please check terminal function Setting (S2～S8)（B01～B07）
	S3	Multifunction input3	
	S4	Multifunction input4	
	S5	Multifunction input5	
	S6	Multifunction input6	
	S7	Multifunction input7	
	S8	Multifunction input8	
	SP	+24V power	Max.output current :500mA
	SC	Public input terminal	Public terminal for signal input
Simulate value	FMA	Simulate monitor (FC public terminal)	Output monitor signal of simulated voltage 0～+10VDC

SORT	symbol	Terminal name	FUNCTION
Simulate value	FMA	Simulate monitor (FC public terminal)	Choose one of the following choices as the minitoring target： 1. output frequency(10V/max frequcncy A10) 2. output current flow(10V AC motor drivers rated current) 3. power output(10V AC motor driver rated current) 4. DC voltage10V/400V(200V grade)800V(400V grade)
Joint output	Y1/Y2 A/B/C	Optional signal output relay	AC motor drivers output minitor signal by transitor OC, signals are "RUNNING, FREQUENCY ARRIVAL, OVERLOAD FORCAST, ETC…There is 4 output singals altogether. Please check terminal function setting.
	Y3Y4	Y3,Y4 Transitor OC output Y3、Y4	
communic -ation	DA DB	RS485 communic ation input/output	RS485 communication input/ output terminal connecting max.31 AC motor drivers
grounding	EG	Control wire grounding protection	Control wire grounding protection Control wire grounding protection

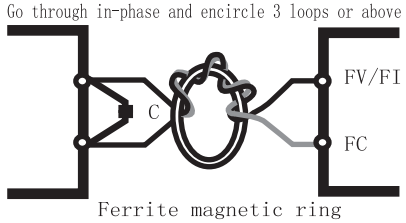
Analog input terminals (FS, FV, FI, FC)

■ The connection with analog signal is especially easy to be influenced by the interference of external noise, thus the wire should be as short as possible (less than 20m), and shielding wire should be used. The outer wire mesh of the shielding wire should be basically grounded, but if the inducing noise is very loud, it is better to connect it to the FC terminal.

■ For the need of using contact in this circuit, the double-fork contact which can process weak signals should be used. Besides, the terminal FC should not adopt contact control.

■ While connecting with the external analog signal follower, sometimes the interference caused by the analog signal follower or the AC motor driver will

lead to misoperation, in such conditions, the capacitor and the magnetic core of ferrite may be connected to the external analog follower, as shown below:



Input terminals of contact (S1~S8)

■ While controlling the input of contacts, in order to prevent bad contact, the contacts that have high reliability for the contact with weak signals should be used.

Output terminals of transistor(Y3, Y4)

■ The polarity of the external power supply should be correctly connected.

■ While connecting the control relay, the surge absorber should be connected with the two ends of field coil. Please ensure that the polarity is correctly connected.

Others

■ It's best to use the shielding wires as control wires, the isolation network divested segment before the terminals should not be exposed.

■ The wires of control terminals should keep away from the wires of the main loop, or misoperation may be caused due to noise interference. If an intersection is needed, make them intersect with a right angle.

■ Generally the control wires don't have good insulation. If the insulation layer is broken due to some reason, high voltage may enter the control circuit (control panel), leading to circuit damage, equipment accidents or personal

Danger.

■The control wires in the AC motor driver should be fixed properly to prevent them from the direct contact with the charge-carrying part of the main circuit (e.g. the terminal strips of the main circuit).

3.1 Check and Test before OperationT

The following matters should be paid attention before the operation:

■ Check if wire connection is correct. Confirm AC motor driver output permInal U, V, W is not connected to POWER and the ground terminal E(G) is grounded well.

■ Confirm there is no short circuit within every terminal and electricitied naked part.

■Confirm all terminals connection and joints are tight and not loose

■Ensure that the motor isn't connected with loaded machine.

■Before turning the power on, ensure that all the switches are in the disconnected state to guarantee that the AC motor driver won't start or operate abnormally when the power is on.

■ The power supply can only be turned on after the upper cover is installed.

■It is forbidden to operate the switch with wet hand.

■Display of the keypad panel (no indication of faults)

■The cooling fan installed in the AC motor driver should work normally.

3.2 Running way

There are many running ways showed in "Chapter 4 CONTROL PANEL AND OPERATION" and Chapter5 "FUNCTION DATA ILLUSTRATIO N". Choose the best operation way according to actual need and running regulations.The common running ways are listed on figure 7-1

running way	frequency setting	running order
key panel operation	Keyboard keys select ▲ ▼ ≫ or panel adjustment potentiometer	Press button FWD or REV to satart and STOP to stop
Remote Control	potentiometer or simulated voltage current	Input joint terminal S1-SC、S2-SC

3.3 Test Run

If no abnormality is detected after the inspection and preparation before the operation according to 3-1, the test run can be performed. When the products leave the factory, they are set to work in the external terminal operation mode, which can be switched to manipulator operation mode via the key combination of RESET+STOP.

1. After the power supply is on, confirm that the LED displays the frequency 0.00Hz.

2. Set low frequency around 5Hz via key

3.Press **REV** or **FWD** to start and **STOP** to low down and stop

4.Check the following before running:

Check whether the rotation of motor is correct.

Check whether the rotation of motor is steady (without abnormal noise or vibration).

Check whether the acceleration / deceleration are steady.

If there is no abnormality, perform the test run with frequency increased. If no abnormality happens in the test run above, the formal operation can be started.

Notice!

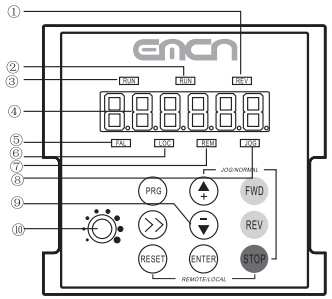
If there is any abnormal phenomena occured, stop AC motor driver immediately. Consult "fault diagnosis" to find the problem. When AC motor driver stops, terminal L1/R1, L2/S, L3/T is still with power if main circuit is not switched off. Any touch onto terminal U, V, W will be shocked. Besides, wave filter capacitor is still full of charging voltage and need certain period of time to discharge, if main circuit power is off. Touch inner AC motor driver circuit only after power and the DC circuit voltage tested by DC circuit voltage meter is below safety voltage.

4.1Appearance & Operation Procedure of LCD Keypad Panel

LED operation panel is composed of a 6-bit 8-segment nixietube and 7 LBDs,able to display the Chinese, English and Russian, as well as the operation status of AC motor driver, operation direction, alarm, pre-alarm information, panel/remote control directions, monitoring data, I/O status, function of parameters, and data settings.

The panel is detachable, and isolated from input potential. During the operation, the panel is allowed to be removed, but when the operation is related to the panel, e.g. the run/stop and frequency setting are controlled by the panel, it is not recommended to do so.

4.1.1Appearance of the Keypad Panel of Nixie Tube



1. REV This LED indicator light will be on when the motor is in positive rotation
2. FWD This LED indicator light will be on when the motor is in reverse rotation
3. RUN This LED indicator light will be on when the moto is running
4. 6-bit LED nixietubes display
5. FAL This LED indicator light will be on when the frequency converter has faults.
6. LOC This LED indicator light will be on when controlled by the Panel.
7. REM This LED indicator light will be on when controlled by the control mode set by A03
8. JOG This LED indicator light will be on when inching condition
9. Operation area of touch buttons
10. Knob of potentiometer

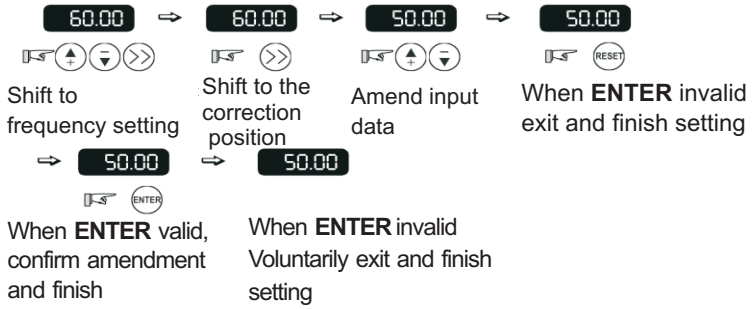
Functions of key combinations:

STOP + RESET：Pressing STOP and RESET simultaneously can switch the status between LOCAL and REMOTE.

STOP + ⊙：When the panel status is LOC, pressing STOP and ⊙ simultaneously can enter or exit INCHING status.

4.1.2Operation Procedure of LCD Keypad Panel

Use ⊙ ⊙ to set frequency on the initial interface.



Notice!

When control function is valid on the control panel, START、FWD、STOP button is invalid when shift to frequency setting.

Use panel potentiometer to set frequency on the initial interface:

Under the initial interface,using potentiometer can alter the frequency setting, turning it left will reduce the setting and turning it right will increase the setting. When gently pressing the potentiometer, the operation position can be chosen for alteration in order to acquire the frequency needed for quick alteration.

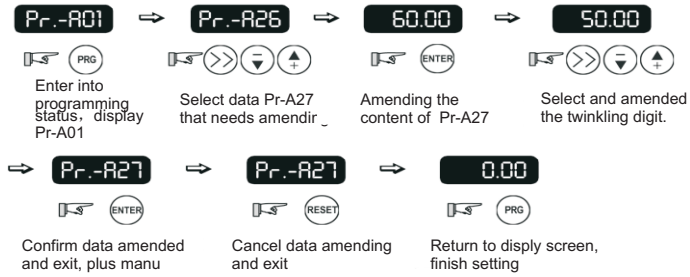
SHIFT OF MONITORING TARGET：

Press ENTER to shift to monitoring target. It displays the monitoring data first,then shift to display data 1 second later.

NO.	LED dispaly	Item illustration
0	F-OUT⟶ 50.00	Actual frequency output value
1	F-SET⟶50.00	Actual frequency setting value
2	V-OUT⟶380.0	Actual voltage output value
3	A-OUT⟶11.0	Actual current output value
4	KVA ⟶ 7	Actual power output value
5	EDC ⟶540	DC current voltage inside AC motor driver
6	PID ⟶ 0.000	The current value of the closed-loop feedback
7	TEP ⟶ 37	AC motor driverradiator temperature
8	S1-8⟶111	S1-S8 outside terminal input, 1valid, dark invalid
9	Y1-Y4 ⟶ 11	Y1-Y4 outside terminal output, 1 valid, dark invalid
10	HOU ⟶ 103	AC motor driver total running or in power time(select by Pr-C31)
11	VER ⟶ 2.00	Control panel edition

POWER DATA SETTING:

（EXAMPLE：change first frequency to：50.00Hz）



Reference Table of Code

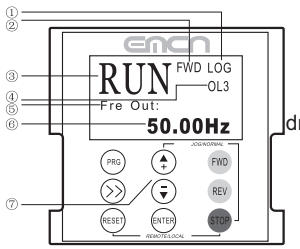
A	B	C	D	E	F	G	H	O	S	N	L	T	P	R	U
R	b	Cc	d	E	F	G	H	Oo	S	n	L	r	P	r	Uu

4.2 Appearance & Operation Procedure of LCD Keypad Panel

LCD operation panel is a 128*64 lattice black and white LCD screen, able to display the Chinese, English and Russian, as well as the operation status of AC motor driver, operation direction, alarm, pre-alarm information, panel/remote control directions, monitoring data, I/O status, function of parameters, and data settings.

The panel is detachable, and isolated from input potential. During the operation, the panel is allowed to be removed, but when the operation is related to the panel, e.g. the run/stop and frequency setting are controlled by the panel, it is not recommended to do so.

4.2.1 LCDKeyboard Panel Appearance



1. LOC,EMx display the effectivecontrol source.
2. WD, REV display the rotation direction during the operation
3. RUN, STOP indicate the operation of AC motor driver
4. Show the fault/ alarm code, inching status
5. Show the monitored parameters
6. Show the specific values of monitored parameters
7. Operation area of touch buttons

Functions of key combinations:

STOP + RESET : Pressing STOP and RESET simultaneously can switch the status between LOCAL and REMOTE.

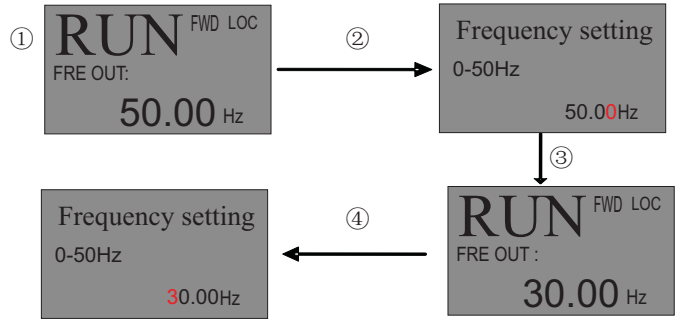
STOP + ▲ : When the panel status is LOC, pressing STOP and ▲ simultaneously can enter or exit INCHING status.

4.2.2Operation Procedure of LCD Keypad Panel

The data on the panel are arranged in the menu and sub-menu, and the general operation can be conducted in the following way.

Setting of main frequency of panel

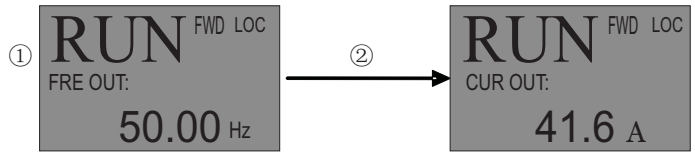
(e.g. the main frequency is altered to: 30.00Hz)



Under the initial interface ①, press to ▲ ▼ » enter the frequency setting interface ②; under the frequency setting interface », pressto choose the position that needs to be altered, then press ▲ ▼ to alter the frequency from 5 to 3, as ③ shown; after finishing the frequency setting, press ENTER to end, as ④ shown.

Switch of the monitored parameters

(e.g. the monitored parameter is altered to: output current)



Under the initial interface ①, press ENTER to switch the monitoring content, as ② shown.

CODE	LCD display	MEANING
0	Fre Out	Frequency output value
1	Cur Out	Current output value
2	Vol Out	Voltage output value
3	Pow Out	Power output value
4	EDC	DC circuit voltage
5	PID	feedback value
6	Fre Set	frequency setted

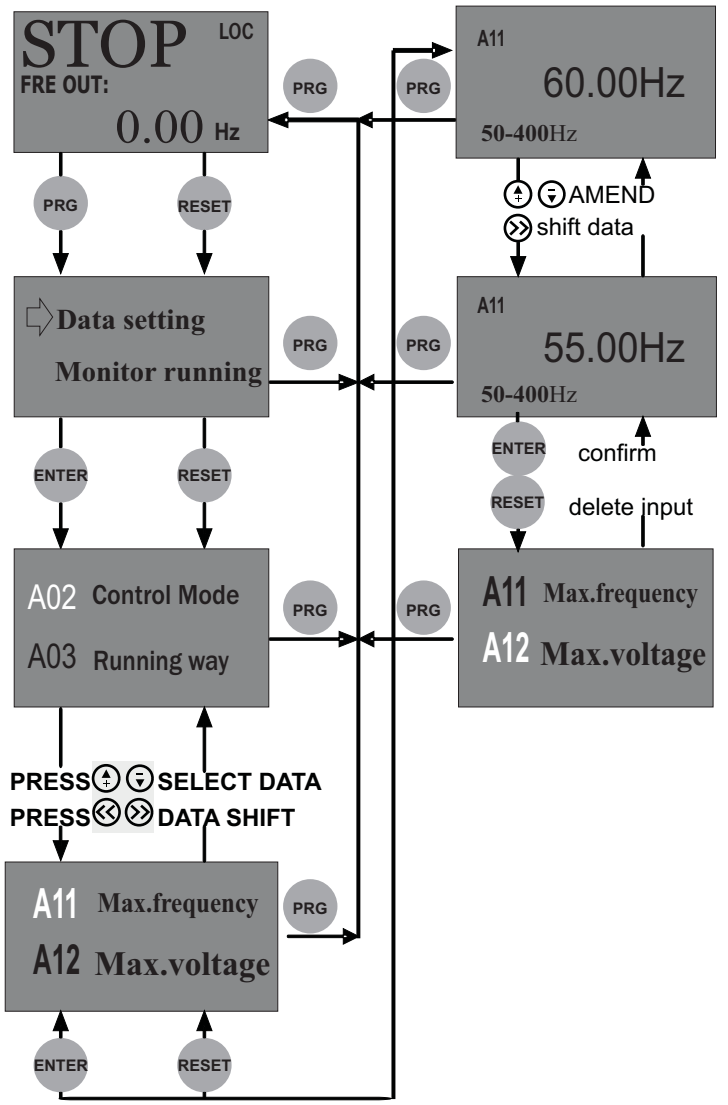
operations like parameter setting/ operation data/ maintenance information/ fault information / data copy

Under the initial interface, press PRG to enter the operation interface, press ▲▼ to choose the functional option, press ENTER to enter the functional menu, press RESET to return to the initial interface, press ▲▼ to switch the pages, and press RESET to exit.

CONTENT	LCD DISPLAY		FUNCTION
1.data setting	During installation,set AC motor driver data to be proper value.There is 6 relative group data in data setting manu.		
2.monitor running	First screen	Fout = x x x.x x Hz	Frequency output value
		I out = x x . x A	Current output value
		Vout = x x x V	Voltage output value
	Second screen	S 1 = 1 X 4 = 0 S 2 = 0 X 5 = 0 S 3 = 1 X 6 = 0	Status of input terminal S1~S8 and Y1~Y4 output terminal (connect input terminal and CM terminal to be 1 is valid , 0 is invalid.)
	Third screen	S 7= 0 Y2 = 0 S 8 = 0 Y3= 0 Y1 = 0 Y4= 0	
3. Maintena-nce information	First screen	EDC= x x Xv TMPF=xx ℃ TIME= x x x x x h	Middle DC voltage
			AC motor driver inner temperature
			AC motor driver total running time
	second screen	KVA =400V /18A	AC motor driver power grade
		MINV = V e r x.x	Main board ROM edition
		KINV = V e r x.x	Panel ROM edition
4. alarm information	only one screen	-1= -4= -2= -3=	Monitor 4 problems before power off/power off/problem remove.
5. data copy	only one screen	<DATA COPY> STV2.1 READ	Data copy and checking for batch AC motor driver data setting
6.Specialized function	Users can not modify these parameters or view.Only in the maintenance of the course or need to replace the control panel,by the manufacturer to modify professionals		

FUNCTION DATA SETTING

(e.g. the max frequency is altered to: 30.00Hz)



5.1 Function parameter list

Data	LED	LCD	Limit	Factory Value	Address
Parameter selection/ initialization	Pr-A01	A01data select	0～7	0	0001H
Control Mode selection	Pr-A02	A02 control Mode	0～1	1	0098H
Operation mode selection	Pr-A03	A03 running way	0～8	3	0002H
Display mode	Pr-A04	A04 display mode	0～3999	0	001CH
Stopping method	Pr-A05	A05 stop mode	0～3	0	0004H
Motor rotation	Pr-A06	A06 power phase	0～1	0	0005H
	Pr-A07	A07 opsition direction forbidden	0～1	0	0006H
Input voltage setting	Pr-A08	A08input voltage	150.0V～255.0V*1	200.0V*1	0003H
V/F mode	Pr-A09	A09V/F selection	0～15	15	000AH
	Pr-A10	A10 rated power	150.0V～255.0V*1	200.0V*1	000BH
	Pr-A11	A11 max. frequency	50.00Hz～400.00Hz	50.00Hz	000CH
	Pr-A12	A12max. voltage	0.1V～255.0V*1	200.0V*1	000DH
	Pr-A13	A13base frequency	0.20Hz～400.00Hz	50.00Hz	000EH

Data	LED	LCD	Limit	Factory Value	Address
V/F mode	Pr-A14	A14middle output Frequency	0.10Hz～399.99Hz	3.00Hz	000FH
	Pr-A15	A15 millde voltage	0.1V～255.0V*1	12.0 V*1	0010H
	Pr-A16	A16 start Frequency	0.10Hz～10.00Hz	1.50Hz	0011H
	Pr-A17	A17 start voltage	0.10V～100.00V*1	6.0V	0012H
Setting times for speed up and down	Pr-A18	A18 Acceleration time 1	0.0S～3600.0S	10.0S	0013H
	Pr-A19	A19 Deceleration time 1	0.0S～3600.0S	10.0S	0014H
	Pr-A20	A20 Acceleration time 2	0.0S～3600.0S	10.0S	0015H
	Pr-A21	A21 Deceleration time2	0.0S～3600.0S	10.0S	0016H
	Pr-A22	A22 Acceleration time3	0.0S～3600.0S	10.0S	0017H
	Pr-A23	A23 Deceleration time3	0.0S～3600.0S	10.0S	0018H
	Pr-A24	A24 Acceleration time4	0.0S～3600.0S	10.0S	0019H
	Pr-A25	A25 Deceleration time4	0.0S～3600.0S	10.0S	001AH
S-curve selection	Pr-A26	A26curve selection	0～3	1	001BH
Setting frequency order	Pr-A27	A27 Frequency reference 1	0.00Hz～400.00Hz	0.00HZ	001DH
	Pr-A28	A28 Frequency reference 2	0.00Hz～400.00Hz	0.00HZ	001EH

Data	LED	LCD	Limit	Factory Value	Address
Setting frequency order	Pr-A29	A29 Frequency reference 3	0.00Hz～400.00Hz	0.00HZ	00FH1
	Pr-A30	A30 Frequency reference 4	0.00Hz～400.00Hz	0.00HZ	0020H
	Pr-A31	A31 Frequency reference 5	0.00Hz～400.00Hz	0.00HZ	0021H
	Pr-A32	A32 Frequency reference 6	0.00Hz～400.00Hz	0.00HZ	0022H
	Pr-A33	A33 Frequency reference 7	0.00Hz～400.00Hz	0.00HZ	0023H
	Pr-A34	A34 JOG Frequency	0.00Hz～400.00Hz	6.00HZ	0024H
Output frequency	Pr-A35	A35 Frequency upperlimit	0%～100%	100%	002CH
	Pr-A36	A36 Frequency lowerlimit	0%～100%	0%	002DH
Jumping Frequency setting	Pr-A37	A37 jump frequency Hz1	0.00Hz～400.00Hz	0.00HZ	0050H
	Pr-A38	A38 jump frequency Hz2	0.00Hz～400.00Hz	0.00HZ	0051H
	Pr-A39	A39 Jump frequency bandwidth	0.00Hz～25.00Hz	1.00HZ	0052H
Simple PLC running setting	Pr-A40	A40 running mode	0～3	0	008CH
	Pr-A41	A41 step 1 mode	F1, 0S～R4 ,4000S	F1,0S	0025H

Data	LED	LCD	Limit	Factory Value	Address
Simple PLC running setting	Pr-A42	A42 step 2 mode	F1, 0S～R4 ,4000S	F1,0S	0026H
	Pr-A43	A43 step 3 mode	F1, 0S～R4 ,4000S	F1,0S	0027H
	Pr-A44	A44 step 4 mode	F1, 0S～R4 ,4000S	F1,0S	0028H
	Pr-A45	A45 step 5 mode	F1, 0S～R4 ,4000S	F1,0S	0029H
	Pr-A46	A46 step 6 mode	F1, 0S～R4 ,4000S	F1,0S	002AH
	Pr-A47	A47 step 7 mode	F1, 0S～R4 ,4000S	F1,0S	002BH
Select multi-function joint terminal	Pr-B01	Terminal S2 selection	0～26	0	0031H
	Pr-B02	Terminal S 3 selection	2～26	2	0032H
	Pr-B03	Terminal S 4 selection	2～26	4	0033H
	Pr-B04	Terminal S 5 selection	2～26	9	0034H
	Pr-B05	Terminal S 6 selection	2～26	10	0035H
	Pr-B06	Terminal S 7 selection	2～26	11	0036H
	Pr-B07	Terminal S 8 selection	2～27	12	0037H
Multi-function joint output function	Pr-B08	Terminal Y1 selection	0～20	0	003AH
	Pr-B09	Terminal Y2 selection	0～20	1	003BH

Data	LED	LCD	Limit	Factory Value	Address
Multi-function joint output function	Pr-B10	Terminal Y3 selection	0～20	2	003CH
	Pr-B11	Terminal Y4 selection	0～20	3	003DH
Time function	Pr-B12	B12 ON delaytimer	0.0～25.5S	0.0S	0063H
	Pr-B13	B13 OFF delaytimer	0.0～25.5S	0.0S	0064H
Function selection for frequency order	Pr-B14	B14 Master analog input selection	0～1	0	0040H
	Pr-B15	B15 Aux. analog input selection	0～1	1	0041H
	Pr-B16	B16 Frequency retention	0～1	0	0042H
	Pr-B17	B17 Operation method for frequency reference loss detection	0～1	0	0043H
	Pr-B18	B18 Terminal FV gain	0%～200%	100%	0044H
	Pr-B19	B19 Terminal FV bias	-100%～100%	0%	0045H
Function sllection for output imitate value	Pr-B20	B20 Terminal FMA selection	0～3	0	0046H
	Pr-B21	B21 Terminal FMA Gain	0.01～2.00	1.00	0047H
Test Frequency unanimity	Pr-B22	B22 Frequency detection	0.00Hz～400.00Hz	0.00Hz	005FH

Data	LED	LCD	Limit	Factory Value	Address
G/P select	Pr-B24	B24 G/P selection	0～1	*3	00A5H
Adjust wave Frequency	Pr-C01	C01 Carrier frequency	1～9	*3	0048H
	Pr-C02	C02 instant stop mode	0～2	0	0049H
Instant power off and speed search control	Pr-C03	C03 Speed search Current	0%～200%	110％	004AH
	Pr-C04	C04 Minimum baseblock time	0.5S～5.0S	*3	004BH
	Pr-C05	C05 V/f reduction level during speed searc	0%～100%	*3	004CH
	Pr-C06	C06 Instant stop time	0.0～2.0S	*3	004DH
Trouble and reset	Pr-C07	C07 Automatic retry attempts	0～10	0	004EH
	Pr-C08	C08 Fault contact selection during automatic retry	0～1	0	004FH
DC break	Pr-C09	C09 DC injection current	0%～100%	50%	0056H
	Pr-C10	C10 DC injection time at stop	0.0S～10.0S	0.5S	0057H
	Pr-C11	C11 DC injection time at Start	0.0S～10.0S	0.0S	0058H

Data	LED	LCD	Limit	Factory Value	Address
Moment of force compensation	Pr-C12	Cc12 Torque compensation gain	0.0～3.0	1.0	0059H
	Pr-C13	C13 Motor line-to-line resistance	0.000R～65.530R	*3	005AH
	Pr-C14	C14 Motor iron loss for torque compensation	0W～9999W	*3	005BH
Rotating margin correction	Pr-C15	C15 Increase rotation margin	0.0%～9.9%	0.0S	00H85
	Pr-C16	C16Motor no load current	0%～99%	30%	0086H
	Pr-C17	C17 correct delay	0.0S～25.5S	0.0S	0087H
Electronic heat protection	Pr-C18	C18Motor rated current	10%~200%In	*3	002EH
Stop over flow and speed lose	Pr-C19	C19 Motor thermal protection	0～4	1	002FH
	Pr-C20	C20 loose speed	0～1	1	005CH
	Pr-C21	C21 speed up standard	30%～200%	*3	005DH
Test over-rotation moment of force	Pr-C22	C22 running standard	30%～200%	*3	005EH
	Pr-C23	C23rotating force test	0～4	0	0060H

Data	LED	LCD	Limit	Factory Value	Address
Test missing phase input and output	Pr-C24	C24 rotation standard	30%～200%	160%	0061H
	Pr-C25	C25 over retating force T	0.1S～10.0S	0.1S	0062H
	Pr-C26	C26 Inputphase lossdetection level SPI	1%～100%	20%	0068H
	Pr-C27	C27 SPI delay	2S～255S* 1.25S	8S	0069H
	Pr-C28	C28 SPO standard	0%～100%	0%	006AH
	Pr-C29	C29 SPO delay	0.0S～2.0S	0.2S	006BH
Setting AC motor driver cumulative operating time	Pr-C30	C30Power selection	*4	*3	008BH
	Pr-C31	C31 Elapsed timer selection	0~1	1	0053H
	Pr-C32	C32 Elapsed timer L	0H～9999H	0H	0054H
	Pr-C33	C33Elapsed timer H	0～27* 10000H	0H	0055H
PID control	Pr-D01	D01 PID select ion	0～3	0	006CH
	Pr-D02	D02 Feedback calibration gain PID	0.00～10.00	1.00	006DH
	Pr-D03	D03 Proportional gain PID	0.0～10.0	1.0	006EH
	Pr-D04	D04Integral time PID	0.0S～100.0S	10.0S	006FH
	Pr-D05	D05Derivative time PID	0.00S～	0.00	0070H

Data	LED	LCD	Limit	Factory Value	Address
PID control	Pr-D06	D06PID bias	109%～109%	0%	0071H
	Pr-D07	D07 Limit of integral value PID	0%～109%	100%	0072H
	Pr-D08	D08 Filtering time of PID	0.0S～2.5S	0.0S	0073H
	Pr-D09	D09 Feedback loss detection PID	0～1	0	0074H
	Pr-D10	D10 Feedback loss detection level PID	0%～100%	0%	0075H
	Pr-D11	D11 Feedback loss detectiondelay time PID	0.0S～25.5S	1.0S	0076H
Energy saving control	Pr-E01	E01 Energy saving selection	0～1	0	0077H
	Pr-E02	E02 Energy saving gain	0.00～655.00	*3	0078H
	Pr-E03	E03 Energy saving voltage lower limit at 60Hz	0%～120%	50%	0079H
	Pr-E04	E04 Energy saving voltage lower limit at 60Hz	0%～25%	12%	007AH
	Pr-E05	E05 Time of Energy saving	1～200	1	007BH

Data	LED	LCD	Limit	Factory Value	Address
Energy saving control	Pr-E06	E06 Limit voltage of Energy saving	0%～100%	0%	007CH
	Pr-E07	E07 100%anti-jump	0.1%～10.0%	0.5%	007DH
	Pr-E08	E08 5%anti-jump	0.1%～10.0%	0.2%	007EH
Rs485 communication control	Pr-F01	F01 MODBUS address	0～31	0	0082H
	Pr-F02	F02 MODBUS BPS selection	0～5	0	0083H
	Pr-F03	F03MODBUS Detection	0～5	3	0084H
	Pr-F04	F04 Modbus time over detection	0～1	1	007FH
	Pr-F05	F05 MODBUS stop methoda communication error CE	0～3	1	0080H
Heat radiator stop mode	Pr-F06	F06 OH Stop Method	0～3	3	0030H
Breaking resitance overheat protection	Pr-F07	F07 DBR protection selection	0～1	0	0065H
Controller function	Pr-F08	F08 Local/remote key function	0～1	1	0007H
	Pr-F09	F09 Local/remote key selection	0～1	0	008AH
	Pr-F10	F10 Stop key function selection	0～1	1	0008H
	Pr-F11	F11 enter key function selection	～1	1	0009H

Data	LED	LCD	Limit	Factory Value	Address
Auxiliary functional	-------	F12 Variable Selection	0～2	1	-------
	Pr-F12 Frequency Installed select	-------	0～1	1	-------
	-------	F13 LCD brigntness	0～10	0	-------
	Pr-F13 Data Manifold Functional	-------	0～2	0	-------
	Pr-F14	F14 Surveillance selection	0～*	0	-------
	-------	F15 Language selection	0～2	0	-------
Error record	Pr-G01	-------	*4	NC	-------
	Pr-G02	-------	*4	NC	-------
	Pr-G03	-------	*4	NC	-------
	Pr-G04	-------	*4	NC	-------

Instruction:

*1On condition of 400V, 2 times of voltage up limit and factory value.

*2Motor rated current output is 10%-200% of AC motor driver rated current.

*3Factory value changes according to AC motor driver capacity.

*4Data for reading only.

5.2 Detailed Description of Functional Parameters

A01 data select Setting limit 0~7 factory value:0

0：changeable data

1：fixed data(user’s data is ok, it can be protected without change)

2-6: reserve

7：initialization setting(change to factory value)

If operater adjust the data with mistake, just change data to & press ENTER key to initialise all the data, then reset.

A02 output choose setting limit：0~1 factory value：1

0: V/F control.

1: general no melt current vector control can improve power.

A03 output choose	setting limit：0~8	factory value：3

There are two ways(LOCAL and REMOTE) to operate EC5000.They can be selected by combined key "**RESET**+**STOP**" only after AC motor driver stops running. The elected operating way will be display on the control panel LCD. AC motor driver is preset to be REMOTE in factory（Through control terminal FV and FI frequency). Multi-function joint input through control terminal S3-S10 is suitable both with LOCAL and REMOTE control.

LOC：frequency and running order is set by operation panel.

REM:select the main frequency and running order according to the following sheet.

setting	Select running order	Select frequency order
0	From control panel	From control panel
1	From control circuit terminal	From control panel
2	From control panel	From terminal FV&FI
3	From control circuit terminal	From terminal FV&FI
4	From control panel	From serial comminication
5	From control circuit terminal	From serial comminication
6	From serial communication	From serial comminication
7	From serial communication	From control panel
8	From serial communication	From terminal FV&FI

A04 display mode	setting limit：0~3999	factory value：0

0:0.01Hz unit

1：0.1% unit

2~39：120×Fre.order（Hz）/A03（set motor grade）=r/min

40 ~ 3999：the forth figure is dot position, the first to third figure to se 100% Fre.

A05 stop mode	setting limit：0~3	factory value：0

Select suitable way to stop：

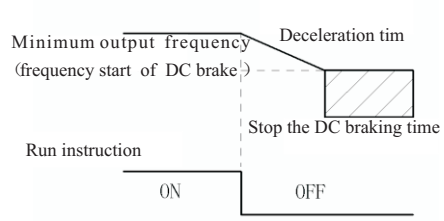
0：low down and stop in first time to retard(factory value)

1：slide to stop

2：slide to stop in first time to retard

3：slide to stop in second time to retard

SETTING 0:low down and stop in first time to retard(factory value)

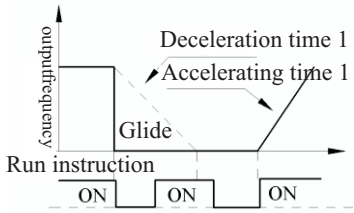


In running order OFF in right and opposite direction, motor retards in retard time 1(A19), and brakes to stop by direct current. If short brake time and big inertia capacity,there will be over voltage(OU)error during retarding. In such circumstances, just extend retard time or install an oppotional brake resistance (Can be installed in EC5000).

Braking moment of force：without brake resistance:20% motor rated moment of force.

with brake resistance：150% motor rated moment of force.

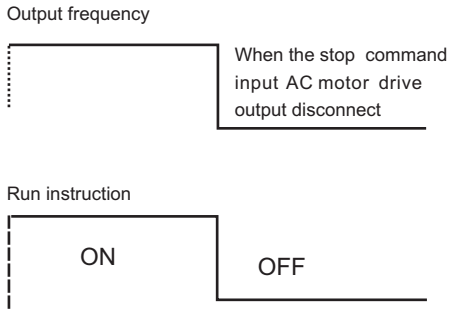
SETTING 1：Glide to stop



Motor begins to slide when cancel right(opposition) direction running order When the stop command input AC motor drive output disconnect

SETTING2: slide to stop with first retard time

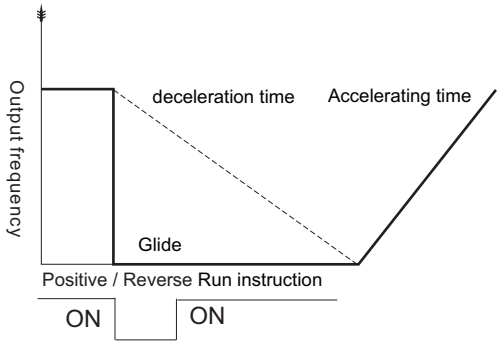
Select increase/decrease speed 1(example)



AC motor driver stops when receiving STOP order and retard to stop. AC motor driver receiving running order and runs after certain time of retard to stop but less than C04 (Min.stop time). AC motor driver stop running during C04 time.

SETTING3: slide to stop with second retard time

Select increase/decrease speed 2(example)



Deliver running order during retard to stop, AC motor driver will not reaction. AC motor driver will start only after retarding time is over. But if retarding times is setting below Min.BB time (C04),running order during BB time is invalid.

A06 power phase position	setting limit：0~1	factory value：0

0 ： motor running direction is anti-clockwise with right running order.

1 ： motor running direction is clockwise with right running order.

A07 opposition forbidden	setting limit：0~1	factory value：0

0：running in opposite direction is available.

1：running in opposite direction is not available it refuse opposite running direction order of control circuit terminal or control panel. This order is suitable for circumstance that opposition running order will cause error.

A08 input voltage	setting limit：150.0V~255.0V	factory value：200.0V*1

Setting AC motor driver input voltage. AC motor driver shift voltage protection according to this value.

A09 V/F selection	setting limit：0~15	factory value：15

0~14：select fixed V/F mode.

15 ： select free V/F mode.

The following page shows the fixed V/F mode,the listed voltge is 200V grade, for 400V grade, the voltage is 2 times that of 200V.

■The following must suitable to select the V/F mode:

A、motor voltage and frequency property

B、motor utmost running speed

■Only select high start moment of force on the following circumstance：(usually not necessary)

A、long connecting wire(150m or longer)

B、voltage reduce too much during START.

C、AC recator is in AC motor driver input and output

D、applies motor that power is smaller than AC motor driver rated output power.

Purpose	Setting	Starting Frequency	Starting Voltage	Intermed-iate Frequency	Intermed-iate Voltage	Reference Frequency	Maximum Voltage	Maximum Frequency
General purpose	0	1.30	6.0	2.50	12.0	50.00	200.0	50.00
	1	1.50	6.0	3.00	12.0	60.00	200.0	60.00
	2	1.50	6.0	3.00	12.0	50.00	200.0	60.00
	3	1.50	6.0	3.00	12.0	60.00	200.0	72.00
Properties of descending torque	4	1.30	5.0	25.00	35.0	50.00	200.0	50.00
	5	1.30	6.0	25.00	50.0	50.00	200.0	50.00
	6	1.50	5.0	30.00	35.0	60.00	200.0	60.00
	7	1.30	6.0	30.00	50.0	60.00	200.0	60.00
High-speed starting torque	8	1.30	7.0	2.50	15.0	50.00	200.0	50.00
	9	1.50	9.0	2.50	20.0	50.00	200.0	50.00
	10	1.50	7.0	3.00	15.0	60.00	200.0	60.00
	11	1.50	1.5	3.00	20.0	60.00	200.0	60.00
Constant output torque	12	1.50	1.5	3.00	12.0	60.00	200.0	90.00
	13	1.50	1.5	3.00	12.0	60.00	200.0	120.00
	14	1.50	1.5	3.00	12.0	60.00	200.0	180.00
	15	1.50	1.5	3.00	12.0	50.00	200.0	50.00

Set motor rated voltage. Calculate fixed V/F mode voltage（A11,A14,A16）It is 2 times for 400V grade

Set special mode when motor(high speed motor) or machinery need special rotaion moment of force adjustment.

The follow conditions should be meet when setting data A10～A17: A16≤A 14≤A 13≤A11

■Motor rotating moment of force increase with voltage increase in V/F mode, but too much increase will cause such problems:

1、Over excitation cause AC motor driver errors.

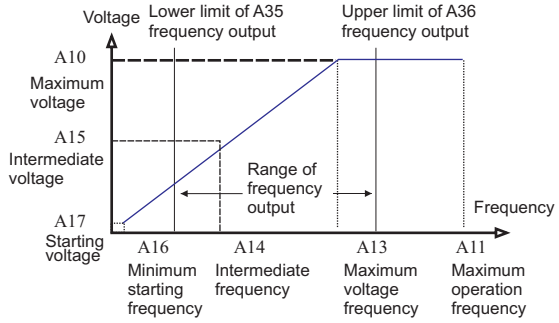
2、Motor overheat and vibrate too much.

Notice!

When increase voltage, check motor current and increase step by step.

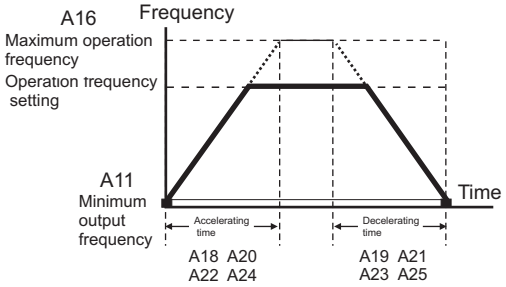
A10 rated voltage	setting limits：150.0V~255.0	factory value：200.0V*1
A11 upmost Fre.	setting limits：50.00Hz-400.00Hz	factory value：50.00Hz
A12 Max.voltage	setting limits：0.1V-255.0V*	factory value：200.0V*1
A13 standard Fre.	setting limits：0.20Hz-400.00Hz	factory value：50.00Hz
A14 middle Fre.	setting limits：0.10Hz-399.99Hz	factory value：3.00Hz
A15 middle voltage	setting limits：0.1V-255.0V*	factory value ： 12.0V*1
A16 lowest Fre.	setting limits：0.10Hz-10.00Hz	factory value ： 1.50Hz
A17 lowest voltage	setting limits：0.1V-100.0V*	factory value ： 6.0V*

The value of Parameter A35 must be higher than the lower limit of the output frequency of Parameter A36. 100% is the setting value of Parameter 01-00. The upper limit of output frequency = (A11*A35) 100



A18	1acc elerate	setting limits: 0.0 - 3600s	factory value: 10.0s
A19	1reduce speed	setting limits: 0.0 - 3600s	factory value: 10.0s
A20	2acc elerate	setting limits: 0.0 - 3600s	factory value: 10.0s
A21	2reduce speed	setting limits: 0.0 - 3600s	factory value: 10.0s
A22	3acc elerate	setting limits: 0.0 - 3600s	factory value: 10.0s
A23	3reduce speed	setting limits: 0.0 - 3600s	factory value: 10.0s
A24	4acc elerate	setting limits: 0.0 - 3600s	factory value: 10.0s
A25	4reduce speed	setting limits: 0.0 - 3600s	factory value: 10.0s

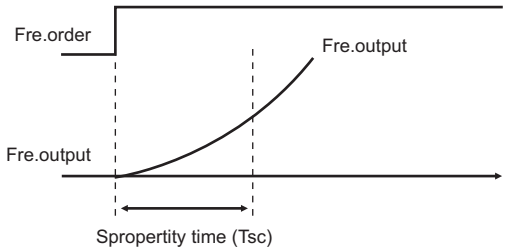
Accelerate time: Times needed to set Frequency output from0% to 100%
Reduce time speed:Times needed to set Frequency output from100% to 0%



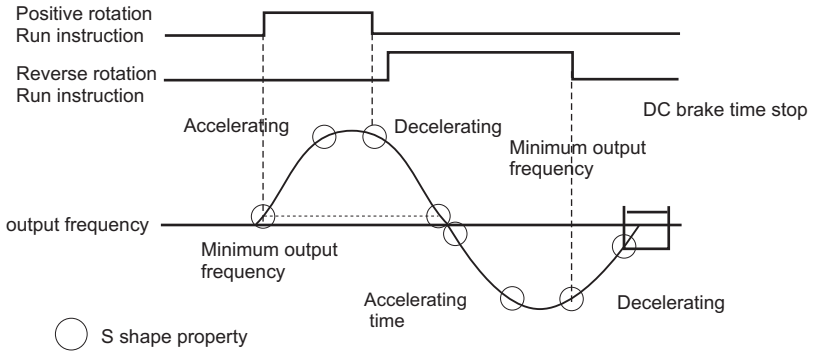
Definition of accelerating time/ decelerating time

A26 select curve	setting limits:0～3	factory value: 1

To avoid shock taken place on mechanical START/STOP, use S curve to accelerate and reduce speed.



0: no S curve
1: 0.2 Sec. (factory value)
2: 0.5 Sec.
3: 1.0 Sec.



A27 main Fre.	setting limits：0.00 Hz ~400.00Hz	factory value：0.00Hz
A28 pace 2 Fre.	setting limits：0.00 Hz ~400.00Hz	factory value：0.00Hz
A29 pace 3 Fre.	setting limits：0.00 Hz ~400.00Hz	factory value：0.00Hz
A30 pace 4 Fre.	setting limits：0.00 Hz ~400.00Hz	factory value：0.00Hz
A31 pace 5 Fre.	setting limits：0.00 Hz ~400.00Hz	factory value：0.00Hz
A32 pace 6 Fre.	setting limits：0.00 Hz ~400.00Hz	factory value：0.00Hz
A33 pace 7 Fre.	setting limits：0.00 Hz ~400.00Hz	factory value：0.00Hz

Select multi-pace frequency 1 ~7 by ON/OFF combination of terminal function SS1、SS2 or SS4 inner control multi-pace speed.

A34 JOG/START Fre. setting limits：0.00 Hz ~400.00Hz factory value：6.00Hz

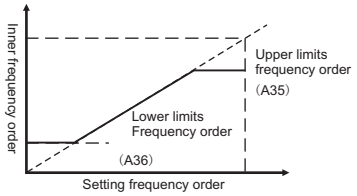
JOG/START Fre. order is valid when multi-function joint terminal input selected to be jog/start order or key jog start order.

A35 up limit Fre.	setting limits：0%~100%	factory value：100%
A36 up limit Fre.	setting limits：0%~100%	factory value：0%

Uplimit Fre.：Set the up limit Fre. with unit of 1% max. Fre.

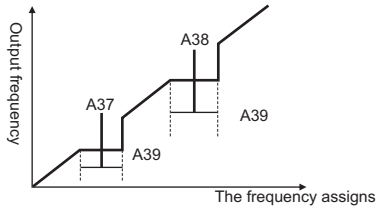
Lower limit Fre.：Set the lower limit Fre. with unit of 1% max. Fre.

When Fre. order is 0, AC motor driver continue running under the lower limit. But, if the lower limit Fre. is smaller than min. Fre. output(A16), AC motor driver doesn't work.



A37 jump Hz1	setting limits：0.00Hz~400.00Hz	factory value：0.00Hz
A38 jump Hz2	setting limits：0.00Hz~400.00Hz	factory value：0.00Hz
A39 jump value	setting limits：0.00Hz~25.00Hz	factory value：1.00Hz

This function forbid or jump the critical frequency for motor to avoid resonance. This function can also control the dead area. Set this value to be 0.00HZ, this function is not working. Set jump Frequency 1 or 2 A37?A38-A39 if this requirement can not be meet, AC motor driver shows constant setting error "PAF".



A40 running mode	setting limits：0~3	factory value：0
A41 pace 1 mode	setting limits：F1~R4 0~4000S	factory value：F1 0S
A42 pace 2 mode	setting limits：F1~R4 0~4000S	factory value：F1 0S
A43 pace 3 mode	setting limits：F1~R4 0~4000S	factory value：F1 0S
A44 pace 4 mode	setting limits：F1~R4 0~4000S	factory value：F1 0S
A45 pace 5 mode	setting limits：F1~R4 0~4000S	factory value：F1 0S
A46 pace 6 mode	setting limits：F1~R4 0~4000S	factory value：F1 0S
A47 pace 7 mode	setting limits：F1~R4 0~4000S	factory value：F1 0S

Mode of operation(internal simple PLC logical control)

0：run according to common control way

1：inner control multi-speed, this mode stops after running for one week

AC motor driver runs with the inner data step by step when run order is given. It stop running automatically one week later. AC motor driver restart when running order is given again.

2：Inner control multi-speed: when repeated running order is given, AC motor driver repeat running step by step according to the inner data. Orders are not accepted except order of STOP, External Error Instant STOP when AC motor driver is running.

3：Inner control multi-speed: after running order is given, AC motor driver runs the inner data step by step. It runs with the last speed after one week.

Program pace:

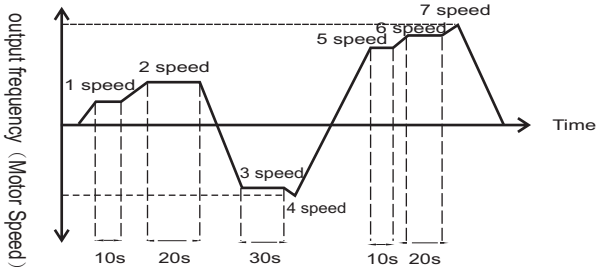
Example: F 2 100

- 100 → pace running time 100S
- 2 → pace accelerate/retard time 2
- F → pace motor running direction: F is anti-clockwise R is clockwise

Notice!

Program pace mode function is to set running direction, accelerate/retard time and running time. Set the idle program pace to be “0”, they will be jumped and change to the next pace.

FUNCTION	SET VALUE	RUNNING(SET)VALUE
A40 mode running	1	————
A41 pace 1 mode	F1 10.0S	A27 main Frequency
A42 pace 2 mode	F2 20.0S	A28 pace 2 Frequency
A43 pace 3 mode	R3 30.0S	A29 pace 3 Frequency
A44 pace 4 mode	R4 0.0S	A30 pace 4 Frequency
A45 pace 5 mode	F2 10.0S	A31 pace 5 Frequency
A46 pace 6 mode	F3 20.0S	A32 pace 6 Frequency
A47 pace 7 mode	F1 0.0S	A33 pace 7 Frequency



Notice!

During above running example, if press STOP key, timer also stops. If restart again, it return to the original speed and continue. If need to stop during running, press RESET key.

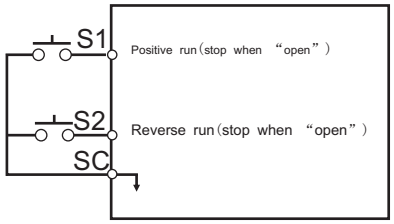
B01 S2 function	setting limits：0~26	factory value：0
B02 S3 function	setting limits：2~26	factory value：2
B03 S4 function	setting limits：2~26	factory value：4
B04 S5 function	setting limits：2~26	factory value：9
B05 S6 function	setting limits：2~26	factory value：10
B06 S7 function	setting limits：2~26	factory value：11
B07 S8 function	setting limits：2~26	factory value：12

Multi-function joint S2-S8 input：

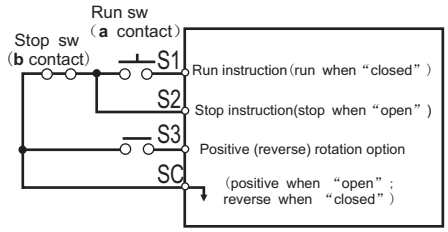
SET	NAME	ILLUSTRATION
0	Opposite running order(2 wire)	Set only on data B01
1	Right/opposite running order(3 wire)	Set only on data B01
2	External error(OFF joint input)	AC motor driver stop by error when external error signal input
3	External error(ON joint input)	Stop output, it shows “EF*”on digital display
4	Error reset	Error resume not allowed when input running order
5	Local/remote selection	————
6	Transmit/control circuit terminal selection	————
7	Abnormal stop	Retard to stop by retard time 2 when inputing
8	Main Frequency order input selection	Select main Frequency order to input(“OFF” for voltage input, “ON” for current input)
9	Multi-speed order 1/SS1	————
10	Multi-speed order 2/SS2	
11	Multi-speed order 4/SS4	
12	Jog running	————
13	Accelerate/retard time selection 1/RT1	————
14	Accelerate/retard time selection 2/RT2	————
15	External BB(normally open contact input)	Slide signal. When input slide signal, motor begin to slide and digital operator shows(BB)
16	External fault (normally open contact input)	

SET	NAME	ILLUSTRATION
17	Searching order from max.Fre.	Speed searching order signal
18	Searching order from max.Fre.	
19	Data setting permitted/frobidden	Select permitted/forbidden set by digital operator or parallel communication(“ON”forbidden, “OFF” permitted)
20	PID resume	———
21	PID control forbidden	
22	Timer function	
23	OH3 (converter overheat alarm)	Input this signal,digital operator displays “OH3”(flashing),AC motor driver continue running
24	Record given simulate value sample and keep	“ON”:simulate Fre.sample “OFF”:keep
25	KEB order (input on “ON” joint)	(running retard to instant stop) when AC motor driver applies in special need as fibre circles,adjust running order to OFF. It can be used as instant stop and emergency situation,such as power OFF. Frequency retard when power is off,AC motor driver continues running with this inertia.
26	KEB order (input on “OFF” joint)	
27	UP/DOWN order	Only data B07 can be set,AC motor driver will increase or decrease frequency by 1 unit. The amended

■**Set 0，1：**



two wire connecting way(set: 0)



three wire connecting way(set:1)

■ **Set 5，6：**

1. LOCAL/REMOTE selection (set 5)

To select operation by control panel or control circuit terminal. LOCAL/REMOTE is available when AC motor driver stops.

OFF: run according to operation way(A03)

ON: run according to Fre.order and running order of digital operator.

(Exampleset) A03 to be 3.

OFF: run according to given Fre.from control circuit terminal FV,FI and running order from control circuit terminal S1,S2.

ON: run according to Fre.order and running order from digital operator.

2. Transmit/control circuit terminal selection(SET:6)

Select running order from transmit or control circuit terminal. This selection function is valid only when AC motor driver stops.

OFF：run according to running way selection(A03)

ON: run according to the transmitted Fre.order and running order

■ **Set 9，10，11：**

Frequency set by external joint input terminal and multi-Frequency pre-set by A27～A33.Select 3 input terminal and their function data set to be 9～11, then multi-frequency can be selected by ON/OFF combination. It can offer 8 target value easily through external terminal in OFF multi-garge value control.

Notice!

Combination ON/OFF switch of terminal function RT1 and RT2 can select 1-4 acclerate and reduce speed. The undefined terminal of function terminal RT1 and RT2 act as OFF.

Combined joint input signal			Fre selection
11（SS4）	10（SS2）	9（SS1）	
OFF	OFF	OFF	A27 main Fre.
OFF	OFF	ON	A28 pace 2 Fre.
OFF	ON	OFF	A29 pace 3 Fre.
OFF	ON	ON	A30 pace 4 Fre.
ON	OFF	OFF	A31 pace 5 Fre.
ON	OFF	ON	A32 pace 6 Fre.
ON	ON	OFF	A33 pace 7 Fre.
ON	ON	ON	A34 JOG Fre.

■Set 13，14：select time of accelerating and reducing speed

Select pre-set time for accelerating and reducing speed from outside terminal inputed signal. Appointe 2 input terminals to be function data 13,14,and use to accelerate and reduce speed by ON/OFF key.

Notice!

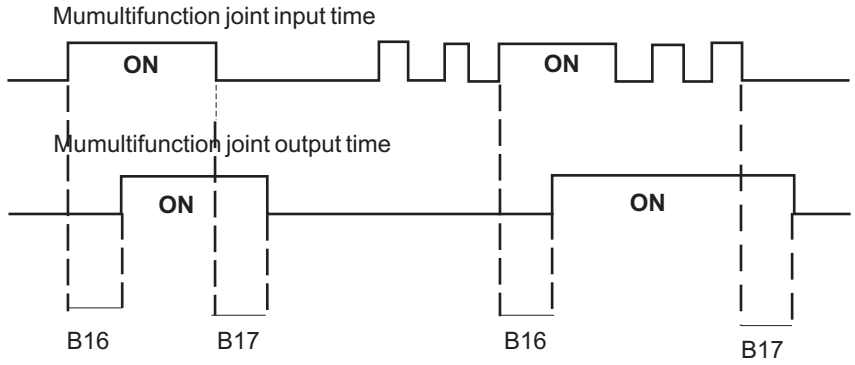
Combination ON/OFF switch of terminal function RT1 and RT2 can select 1-4 acclerate and reduce speed. The undefined terminal of function terminal RT1 and RT2 act as OFF.

Combined signal input		Selected time of accelerating and reducing speed
14（RT2）	13（RT1）	
OFF	OFF	A18 1 accelerate，A19 1 reduce speed
OFF	ON	A20 2 accelerate，A21 2 reduce speed
ON	OFF	A22 3 accelerare，A23 3 reduce speed
ON	ON	A24 4 accelerate，A25 4 reduce speed

■ Set 22：timer function

The timer input is on when timer ON is longer than delay timer(B12)ON.

The timer output is OFF when timer OFF is longer than delay timer(B13) OFF.

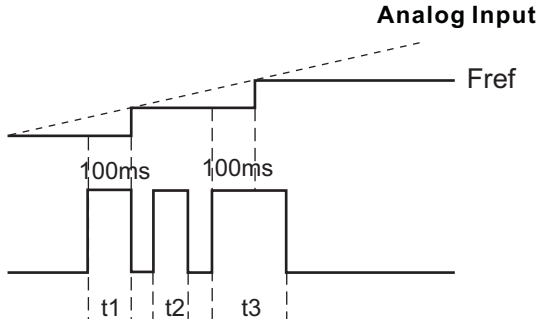


■Setting 24：given simulate value sampling and keep

Simulate Fre. order is sampleing when input terminal is “ON” is 100ms or longer. When input terminal is “OFF”,the simulate Fre.value I kept.

Notice!

1. Keep the given value when t1,t3 is 100ms or longer.
2. Don’t keep the given value when t2 is smaller than 100ms.



■ **Set 27 UP/DOWN order （set B07=27）**

Input right/opposite running order, AC motor driver acclerate/retard when input UP/DOWN order to control circuit terminal S7 and S8 without changing Frequency order.This makes AC motor driver runs at anticipated speed. When UP/DOWN order is appointed by B07, all the function set by data B06 is invalid,and terminal S7 changes to input terminal of UP, S8 changes to be DOWN.

Control circuit terminal S7（UP order）	ON	OFF	OFF	ON
Control circuit terminal S8(DOWN order)	OFF	ON	OFF	ON
Running status	acclerate	retard	keep	keep

The following figure shows the times sheet when input UP/DOWN order U=UP（accelerate status）D=DOWN（decelerate status）H=HOLD（keep） U1=UP status（keep stable on up limit value）D1=DOWN status（keep stable on up limit value）

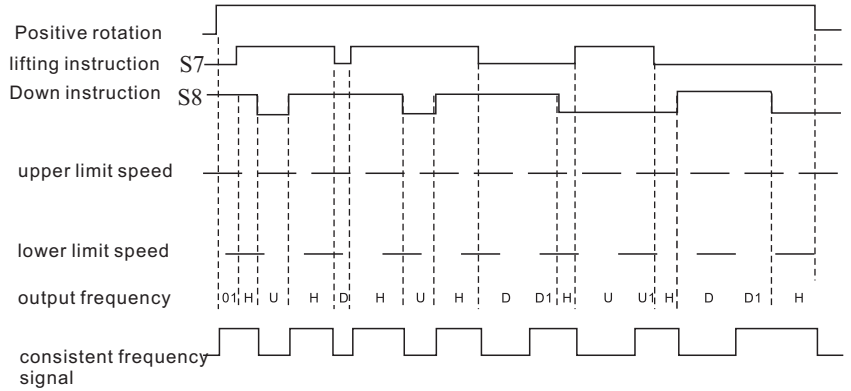
Notice!

1. Set Frequencyup limit value when selecting UP/DOWN order, leave alone Frequencyorder value.

2.The low limit can be from control terminal FV,FI simulate order, the bigger one of AC motor driver order low limit.

3.When input right(opposite)running order,AC motor driver start from low speed limit though there is no UP/DOWN order.

4.If input jog and start order during running with UP/DOWN order, the jog and start order has priority.



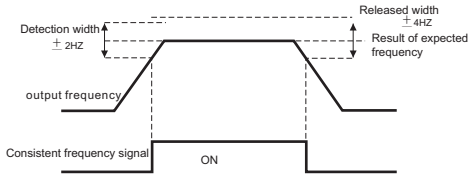
B08 Y1 function	**setting limits**	0~18	factory value	0
B09 Y2 function	**setting limits**	0~18	factory value	1
B10 Y3 function	**setting limits**	0~18	factory value	2
B11 Y4 function	**setting limits**	0~18	factory value	3

Instruction of multi-function output

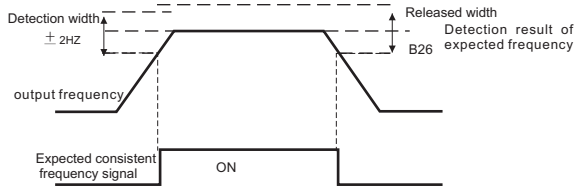
SET	NAME	ILLUSTRATION
0	error	switch off on errors
1	running	switch off when input right/opposite order or innverter output voltage
2	**frequency** unanimous	———
3	any**frequency**unanimous	———
4	**frequency** test	output **frequency**.≤**frequency**.test standard
5	**frequency** test	output **frequency**.≥**frequency**.test standard
6	test over moment of force(on)	———

SET	NAME	ILLUSTRATION
7	test over moment of force(off)	——
8	BB（polar lock）	switch off when AC motor driver output is off
9	running mode	switch off when select panel operation or frequency.order
10	AC motor driver run ready	switch off when AC motor driver has no error and can run
11	timer function	——
12	automatic restart	switch off during error and restart
13	OI（overload）alarm	——
14	given frequency.lost	——
15	transmission data output 1	data output position 1 from RS485 communication
16	transmission data output 2	data output position 2 from Rs485 communication
17	PID feed back lost	——
18	OH1 jalarm	——
19	The output achieves the lower limit frequency	——
20	The output achieves the upper limit frequency	——

■ **Setting: 2，setting example of "frequency unanimous signal"**



■ **Setting: 3，setting example of "any frequency unamious signal"**



B12 ON delay	**setting limits**：0S～25.5S	factory value：0.0S
B13 OFF delay	**setting limits**：0S～25.5S	factory value：0

Input/output filter wave. (see page 55)

B14 main simulate value	**setting limits**：0～1	factory value：0

Main frequency order input way (B14): to input main frequency from control circuit terminal, it can select voltage(0-10V) or current(4-20MA) through setting constant B14.

0： FV，0~10V input

1： FI，4~20mA input

B15 supplementary simulate value	**setting limits**：0～1	factory value：1

Setting constant B15 to chang input current of control circuit terminal FI

0： 0~10V input

1： 4~20mA input

Notice!

set PC board SW1-1 to OFF when setting constant B15 to bo "0".

B16 Fre.keep	**setting limits**：0～1	factory value：0

This function is valid when select UP/DOWN order for muti-function joint input. Set constant B16 to be "0"when UP/DOWN order is used to keep frequency (when power is off).

0：keep the given value in frequency(constant A27)

1：don't keep

Notice!

When B16 is 0, frequency is kept although AC motor driver power is off.

B17 frequency lost	**setting limits**：0～1	factory value：0

Select running way on circumstance that control circuit terminal frequency reduces quickly

0：don't treat

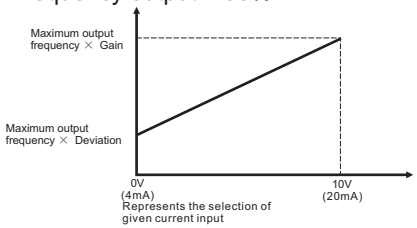
1：treat if AC motor driver order reduces 90% with 400ms,AC motor driver continue running in 80% of the pre-set value

B18 Fre.increase	**setting limit**：0%～200%	factory value：100%
B19 Fre.deviation	**setting limit**：-100%～100%	factory value：0%

When frequency is input by simulate value through control circuit terminal FV and FI, appointe deviation and increase can be set related to the simulated input frequency.

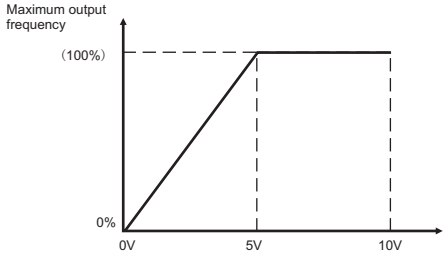
■Frequency ouder increase：frequency order set by 1% unit simulate input value 10V(20mA) max.frequency output: 100%.

■Frequency order deviation：frequency order set by 1% unit simulate input value 0V(4mA) max.frequency output: 100%.

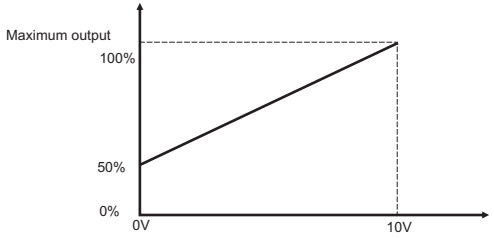

Maximum output frequency × Gain
Maximum output frequency × Deviation
0V (4mA)
10V (20mA)
Represents the selection of given current input

■ **Examples**

AC motor driver runs in 0%-100% frequency order at 0-5V voltage input Increase B18=200 deviation B19=0



AC motor driver runs in 50%-100% frequency order at 0-10V voltage input Increase：B18=10，deviation：B19=50



B20 F M A function	**setting limits**：0～3	factory value：0
B21 F M A function	**setting limits**：0.01～2.00	factory value：1.00

For monitoring, output Fre. output and current output to simulate output terminal FMA-FC

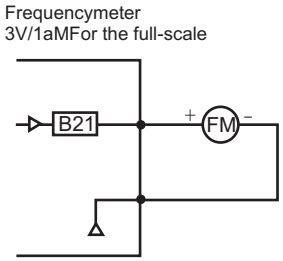
■F M A function：

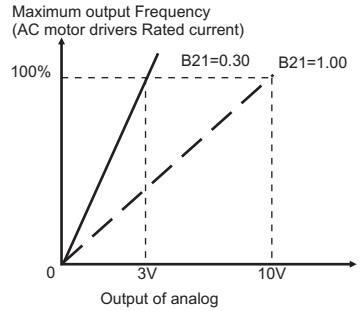
1：current output（10V AC motor driver rated current）

2：power output（10V AC motor driver rated current）

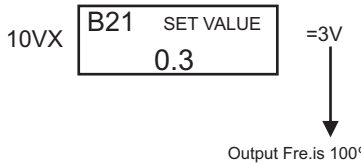
3：DC（10V/400V（200V grade），10V/800V（400V grade）

■F M A increase：correct Fre. meter and galvanometer(B21) to adjust simulate output increase





Set simulate output voltage in 100% Fre. output. Fre.meter showsl 0-60HZ in 0-3V



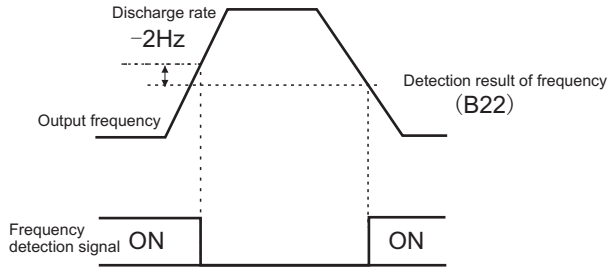
B22 frequency test	**setting limit**：0.00Hz～400.00Hz	factory value：0Hz
B23 FAR value	**setting limit**：0.00Hz～25.00Hz	factory value：2Hz

It is valid when multi-function joint input set to be “Fre.test”(set value: 4 OR 5)

■Frequency test：“frequency test” is functioning when output frequency is over or lower than frequency test standard B22.

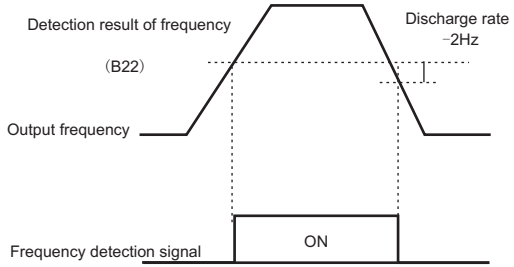
■FAR value：frequency test release width

Frequency test mulit-function joint input set to be “4”（Frequency output≤ Frequency test standard）



■ **Frequency test multi-function joint input set to be“5”**

（Frequencyoutpu≥Frequency test standard）



B24 G/P choose	**setting limits**：0～1	factory value：*3

0: constant torque of G , over load of coefficient :150%1min

1: fan-type pumps of P , over load of coefficient:120%1min

Notice!

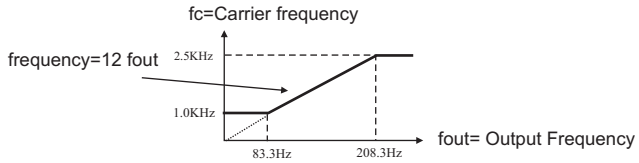
When change this parameters, C18 will change following this. When 0 change to 1 the power of AC motor driver more bigger.

C01 carrier wave frequency	**setting limits**：1～9	factory value：*3

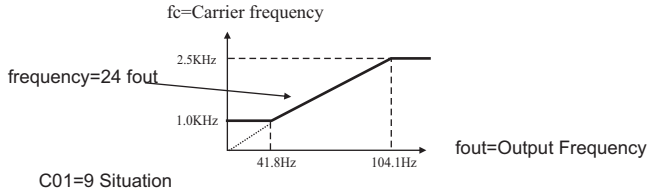
Set AC motor driver output transistor ON/OFF frequency carrier wave

SET	CARRIER WAVE （KHZ）	METAL NOISE FROM MOTOR	DISTURB NOISE AND LEAKAGE CURRENT
7	12 Fout	big ↕ small	less ↕ more
8	24 Fout		
9	36 Fout		
1	2.5		
2	5.0		
3	8.0		
4	10.0		
5	12.5		
6	15.0		

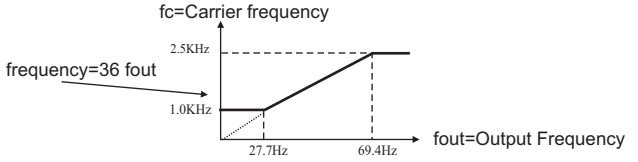
C01=7 Situation



C01=8 Situation



C01=9 Situation



C02 instant stop running	**setting limit**：0～2	factory value：0

0： Don't continue running.

1： Resume power during instant power off compensation time(C06),AC motor driver continue running.

2： AC motor driver continue running when power is resume to normal value in control logic time,and there is no Uul error

Notice!

Keep running order to continue running from instant power off..

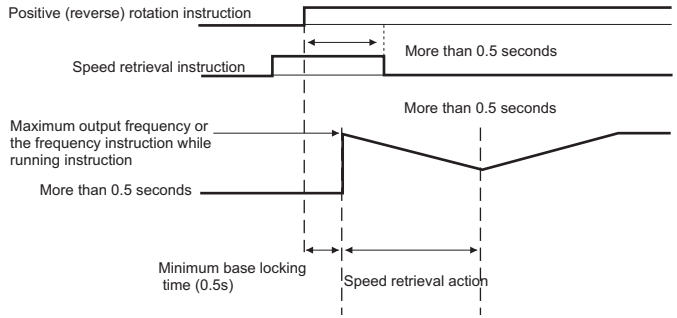
C03 searching speed	**setting limits**：0%～200%	factory value：110%
C04 lock time	**setting limits**：0.5S～5.0S	factory value：*3

This order restart the sliding motor.This function enable motor to shift smoothly between working frequency and inverted frequency.

■Speed search：speed search is setting current grade, AC motor driver rated current is 100% .

■Block time: during speed searching,set in dealing instant power off, the minimal time unit to switch off AC motor driver is 0.1 SEC.

Select(constant B01~B07)： “17” (searching order from max.Fre.output)or “18” to be mulit-function joint input. Set up an order that makes AC motor drive runs in right/opposite order after AC motor driver searching appointed same period of time or later. If running orde is input before searching order,searching order is invalid. The following is the time figure when inputing searching order.


Positive (reverse) rotation instruction
Speed retrieval instruction
More than 0.5 seconds
More than 0.5 seconds
Maximum output frequency or the frequency instruction while running instruction
More than 0.5 seconds
Minimum base locking time (0.5s)
Speed retrieval action

C05 search V/F	setting limits：0%～100%	factory value：*3

Set decreasing standard of speed searching time V/F. During speed searching, V/F=(V/F during common running)×(C05).

C06 instant stop time	setting limits：0.0S～2.0S	factory value：*3

Set compensation instant power off.

C07 auto-retry	setting limits：0～10	factory value：0

Set AC motor driver self diagnose and restart times when error occours.

Set AC motor driver re-start and error test resume after error occured. Auto dia-gnose and re-try times can be set to 10 times in C07. AC motor driver will auto re-start when the following errors occured.

1.OC（over-curent）
2.OU（over-voltage）
3. UV1（low voltage PUV）
4. GF（grounding error）
5. rr（braking transistor error）

Notice!

Set to 0 for retry times in the following circumstance:

1. If there is no other errors occured 10 minutes after re-try.
2. Error resume signal is “ON” when error tested.
3. Power “OFF”.

C08 retry jiont	setting limits：0～1	factory value：0

Error selection during auto-retry:

0: “ON” , during error re-try

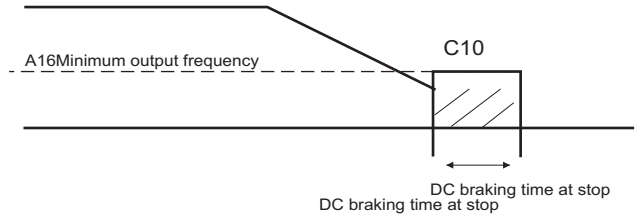
1: “OFF”, during error re-try

C09 braking current	setting limits：0%In～100%In	factory value：50%

Set DC current value when braking, AC motor driver rated current is 100%

C10 stop braking	setting limits：0.0S～10.0S	factory value：0.5S

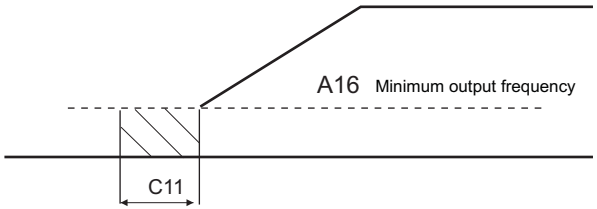
Set the DC braking time when AC motor driver stops. If set to be 0.0S, AC motordriver don't execute DC braking time, but output “OFF” when beginning braking.



C11 start braking	setting limits：0.0S～10.0S	factory value：0.0S

DC braking time when starting

Enables motor to re-start from sliding to stop, set constant C09 DC braking time when starting. If constant C09 is set to be “0.0S”, DC braking is invalid, AC motor driver accelerate to start in min. Fre.output.



DC braking time at start

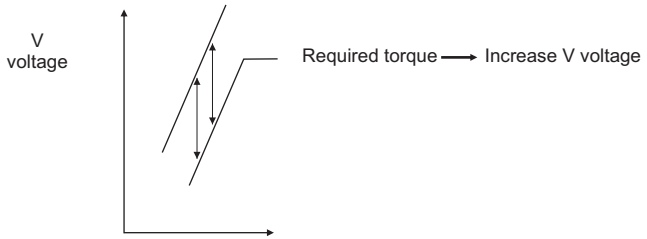
C12 rotating moment of force compensation	setting limits：0.0～3.0	factory value：1.0

Auto rotation moment of force compensation

Motor rotation moment of force may be change according to the load capacity.

Full scale rotation moment of force increase may adjust V/F mode voltage acco-rding to needs.

EC5000 AC motor driver adjust voltage automatically in constant and accelera-ting running speed.



Usually don't need to adjust rotation moment of force compensation(factory setting C12:1.0)Rotation moment of force need to be adjusted when connection wire between AC motor driver and motor is too long or motor vibrating. Increase compensation to increase motor moment of force. But there will be problems if increase too much

- AC motor driver run in unstable status because of motor over curren
- Motor overheat or vibration.

Check motor current when increasing moment of force compensation.

C13 wire resistance	setting limits：0.0R～65.530R	factory value：*3
C14 motor iron loss	setting limits：0W～9999W	factory value：*3

The moment of force data in AC motor driver is pre-set already and don't need to change.

C15 rotation difference increase	setting limits：0.0%～9.9%	factory value：0.0%

Motor loading rotating moment of force difference lead to different motor speed. Rotation difference compensation is increasing AC motor driver output frequency by propotion of motor loading capacity moment of force to decrease motor speed difference.

C16 empty load current	setting limits：0%In～99%In	factory value：30%In

Set motor current with empty load, motor rated current is 100%In

C17 correct delay	setting limits：0.0S～25.5S	factory value：2.0S

Set correct delay data in wave filtering.

C18 rated current	setting limits：10%In～200.0%In	factory value：*3

Set rated current value for motor data plate, electronic overheat protector take it as motor protecting standard current.

C19 overload protection	setting limits：0～4	factory value：1

AC motor driver inner overheat relay protects motor overheat.

Set correctly as follows：

0 ： not protected

1 ： standard motor （time constant 8 minutes）

2 ： standard motor （time constant 5 minutes）

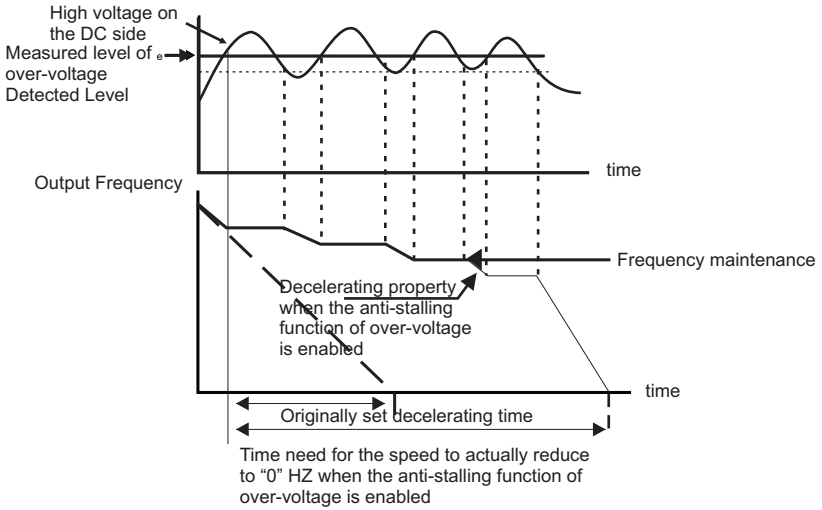
3 ： AC motor driver motor （time constant 8 minutes）

4 ： AC motor driver motor （time constant 5 minutes）

Electronic overheat protection is monitoring motor temperature to protect it form overheat by simulate of AC motor driver output current/frequency and time. When electron overheat relay is functioning it gives “OL1” report and cut off AC motor driver output to avoid motor overheat. If there is only one motor connected to a AC motor driver, external heat relay in not needed. If more than one motor is connected to a AC motor driver, each motor need to install heat relay and set constant(C19)to be “0”.

C20 retard and speed loss	setting limits：0～1	factory value：1

0：without speed loss protection function during retard
1：with speed loss protection function during retard


High voltage on the DC side
Measured level of over-voltage
Detected Level
Output Frequency
time
Frequency maintenance
Decelerating property when the anti-stalling function of over-voltage is enabled
time
Originally set decelerating time
Time need for the speed to actually reduce to “0” HZ when the anti-stalling function of over-voltage is enabled

C21 accelerating standard	setting limits：30%In～200.0%In	factory value：*3

Set speed loss protecting action standard with unit of 1% and AC motor driver rated current 100%.

C22 running standard	setting limits：30%In～200.0%In	factory value：*3

Set speed loss protecting action standard with unit of 1% and AC motor driver rated current 100%.

C23 rotation moment of force test	setting limits：0 ～4	factory value：0

0： without over moment of force testing
1： test only in constant speed, it continue running after testing
2： test during running, it continue running after testing
3： test only on constant speed, AC motor driver is “OFF” after testing
4： test during running, AC motor driver output “OFF” after testing

Set it to be 2 or 4 to test over rotation moment of force during accelerating or retard.

Set it to be 1 or 2 to keep it running after testing over rotation moment of force. Operator displays “OL3”(flashing) alarm during testing.

Set it to be 3 or 4 to temporary stop AC motor driver during over rotation moment of force testing.Operator displays “OL3” error(light on) during testing.

C24 rotation moment of force standard	setting limits：30%In～200.0%In	factory value：160%

Over rotation moment of force test standard: set over rotation moment of force testing current standard with unit of 1%.

C25 over rotation moment of force	setting limits：0.1S～10.0S	factory value：0.1S

Over rotation moment of force testing time:If the time of motor current surpassing rotation moment of force testing standard(C24) is longer than testing time(C25),over rotation moment of force testing function works.

C26 SPI standard	setting limits：1%～100%	factory value：20%

Set input phase missing test grade, with unit of 1%, DC400V (200V grade) and DC800V(400Vgrade) to be 100%.

C27 SPI delay	setting limits：2S～255*1.28S	factory value：8S

Input phase missing test time test time=1.28sec×（C27's value）

C28 SPO standard	setting limits：1%～100%	factory value：0%

Set output phase missing test grade, with unit of 1%, AC motor driver rated current to be 100%.

C29 SPO delay	setting limits：0.0S～2.0S	factory value：0.2S

Set phase missing test time

C30 power selection	factory value：*3

Read only,display AC motor driver power grade

C31 time select	setting limits：0 ～1	factory value：1

0：total time of power on
1：total time for running

C32 timer L	setting limits：0H ～9999H	factory value：0H
C33 timer H	setting limits：0～27*10000H	factory value：0H

When C32 is selected to be action total time, set C32 to be time with unit of 1 hour,and calculate time from then on.

D01 PID selection	setting limits：0 ～3	factory value：0

0：without PID control
1：with PID control(D controls deviation)
2：with PID control(D controls feedback value)
3：with PID control(feedback value is in opposite direction)

■Set target value：

EC5000 AC motor driver can select several target value. Use voltage signal ofcontrol circuit terminal FV or frequency order data A27-A34 to set target value.

1. voltage signal of control circuit terminal FV: select(A03) to be 2 or 3 to set running direction.

2. frequency order data(A27-A34): sellect(A03) to be 0 or 1 to set running direction (combination of multi-function joint, multi-pace speed order and jog/ start order)

■Set feedback value：

Use current signal(4-20mA) or voltage signal(0-10V) of control circuit termin -al to set feedback value.

1. Current signal of control circuit terminal FI: select(B15) to be 1 to set FI function.

2. Voltage signal of control circuit terminal FI: select(B15) to be 0 to set FI function (set PC board SW1-1to OFF)

D02 feedback increase	setting limits：0.00 ～10.00	factory value：1.00
D03 propotion increase	setting limits：0.0 ～10.0	factory value：1.0
D04 integral time	setting limits：0.0S ～100.0S	factory value：10.0S
D05 differential time	setting limits：0.00S～1.00S	factory value：0.00S
D06 PID deviation	setting limits：-109%～109%	factory value：0%
D07 integral limits	setting limits：0% ～109%	factory value：100%
D08 wave filting time	setting limits：0.0S～2.5S	factory value：0.0S

■Feedback increase：small adjustment for PID feedback test value.

■Proportion increase：set P control proportion increase. If set to be 0.0, no P control.

■Integral time：set I control proportion increase. If set to be 0.00, no I control.

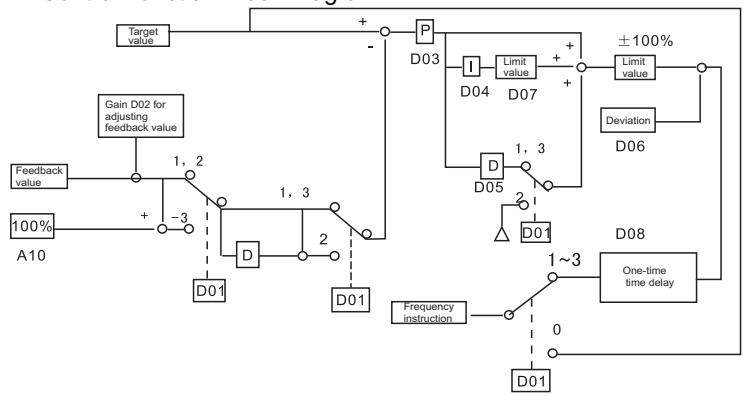
■Differential time：set D control proportion increase. If set to be 0.0, no D control.

■PID deviation：deviation adjustment to frequency order control by PID, with unit of 1%.

■Integral limits：set the up limits value of frequency output controlled by I, with unit of 1%.

■Wave filting time：set the one time delay data of frequency order controlled by PID

PID Control Function Block Diagram



D09 feedback test	setting limits：0 ～1	factory value：0

Test feedback lost（PID）：
0：feedback lost test with PID
1：feedback lost test without PID

D10 standard lost	setting limits：0% ～100 %	factory value：0%

Feedback lost test standard(PID), set losing grade of PID feedback with unit of 1%.

D11 time lost	setting limits：0.0S～25.5S	factory value：1.0S

Delayed feedback lost time(PID), set testing PID feedback lost time

Notice!

Resume value I to O in the following circumstance

1.Order input stopped or stopping.

2.When inputting integral value resume signal with multi-function joint termi -nal(set any one of constant B01-B07 to be 20).

3.The upper limit of I can be set by constant D07. Increase value of constant D07 can improve integral control. If control system vibrating can not be stop by adjust integral time or delay data, just decrease constant D07.

4.PID control can be cancel by signal from multi-function joint input.

5.Set any one of constant B01-B07 to be 21, and switch on this joint during running, PID is cancelled . The anticipated value signal is used as frequency order signal.

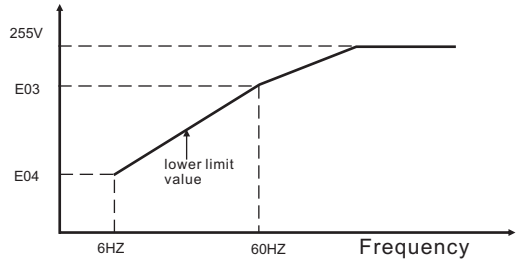
E01 energy saving selection	setting limits：0～1	factory value：0
E02 energy saving increase	setting limits：0.00～655.00	factory value：*3
E03 60Hz voltage	setting limits：0～120%	factory value：50%
E04 6Hz voltage	setting limits：0～25%	factory value：12%

Energy saving selection
0：energy saving control invalid
1：energy saving control valid

The constant used in energy saving control mode is pre-set to be best in factory. It is no need to be adjusted in normal running. If the motor property is different from EC5000 standard motor, please change the constant according to the following illustration.

■Energy saving coefficient（E02）：Use energy saving coefficient in energy saving running mode to calculate the best effective voltage, and input it as given voltage. This value is pre-set by factory according to EC5000 standard motor data. Input voltage increase with energy saving coefficient.

■Energy saving voltage lower limits value（E03，E04）：Set voltage output lower limits value. If the given voltage value is smaller than the appointed lower limits value in energy saving mode, then this lower limits value is taken as given voltage output value. Set lower limits value to avoid speed loss in light load capacity. Set voltage limits in 6Hz or 60Hz voltage outside 6Hz and 600Hz is set by linear with the percentage of motor rated voltage.



Notice!

For 400V grade, this value is 2 time of 200V.

E05 calculating time	setting limits：1～200	factory value：1

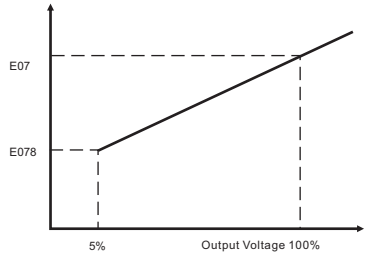
Set average power calculating time in energy saving mode.

E06 voltage limits value	setting limits：0～100%	factory value：0%
E07 100% anti-jump	setting limits：0.1～10.0%	factory value：0.5%
E08 5% anti-jump	setting limits：0.1～10.0%	factory value：0.2%

In energy saving control mode, best voltage is calculate according to the load capacity power. But, the data set is change with temperature or motor from other factory. So,it can not offer best voltage in certain circumstance. Best running is achieved through minimum voltage adjustment.

■Voltage limits value：control voltage through best running. Set with the percentage of motor rated voltage. It can not be set if set percentage to be 0.

■The best running voltage range（E07，E08）：Set a best voltage chang -ing range in a best running circle. It is set with the percentage of motor rated vo -ltage. Ncrease this value,motor speed increase. This voltage range is set in start voltage 100% and 5%. Other voltage value can be set through linner value.



F01 local add	setting limits：0～31	factory value：0
F02 baud	setting limits：0～5	factory value：0
F03 odd/even number test	setting limits：0～5	factory value：3

■Local add：

0：AC motor driver break away from RS485 general control address, non controlled address.

1～31：controlled address of AC motor driver RS485 communication.

It is necessary to set controlled address to avoid number repeat with other controlled address in the same transmitting wire.

■band：

0： 1200BPS
1： 2400BPS
2： 4800BPS
3： 9600BPS
4: 19200BPS
5: 38400BPS

■communication

0:7N2 For ASCII
1:7E1 For ASCII
2:7O1 For ASCII
3:8N2 For RTU
4:8E1 For RTU
5:8O1 For RTU

Please refer to Chapter 6 of the EACN MODBUS communication protocol in the data structure the contents of the section.

F04 transmitting run time	setting limits：0～1	factory value：1

Set run-time test with MODBUS communication：

0：without run-time test

1：with run-time test

F05 C E stop	setting limits：0～3	factory value：1

Way to stop when communication error(EC)：

0：retard to stop(with retard time1)

1：slide to stop

2：retard to stop(with retard time2)

3：continue running(alarm)

F06 O H stop	setting limits：0～3	factory value：3

Stop way when radiator overheat：

0 ： retard/stop 1(error)
1 ： free stop
2 ： retard/stop2(error)
3 ： continue running(alarum)

F07 DBR over heat	setting limits：0～1	factory value：0

Braking resistance overheat protection function：

0： without resistance overheat protection
1： with resistance overheat protection

F08 L / R function	setting limits：0～1	factory value：0

0 ： LOCAL/REMOTE key function: invalid
1 ： LOCAL/REMOTE key function: valid

F09 L / R sellection	setting limits：0～1	factory value：0

0：When LOCAL/REMOTE shifting, re-run is valid when stop order is inputed
1：When LOCAL/REMOTE shifting, re-run is valid at once

F10 enter key	setting limits：0～1	factory value：1

0 ： STOP key is always valid in any operating mode
1 ： STOP key is valid when operator is running within operator running order

F11 enter key	setting limits：0～1	factory value：1

0 ： “ENTER” key not used when set frequency order with operator
1 ： “ ENTER” key used when set frequency order with operator

F12 Variable Selection	setting limits：0～2	factory value：1

Notice!

This function code only in LCD controller

0: m/s

1: Mpa/mm²

2: Kg/ mm²

Pr-F12 fre set select	setting limits：0～1	factory value：1

Notice!

This function code only in LED controller

0:Fre. set by key button number

1:Fre. set by key potentiometer adjustment

F13 LCD brightness	setting limits：0～10	factory value：0

Notice!

This function code only in LCD controller

Usd to adjust the brightness of LCD display

Pr-F13 data rewrite	setting limits：0～2	factory value：0

Notice!

This function code only in LED controller

0: Data copy

1: Data proofreading

2: Data inwrite

F14 monitoring select	setting limits：0～6	factory value：0

Notice!

This function code only in LCD controller

0: setting frequency

1: output frequency

2: output current flow

3: voltage output

4: power output

5: voltage EDC

6: feedback PID

Pr-F14 monitoring select	setting limits：0～11	factory value：0

Notice!

This function code only in LED controller

0: output frequency

1: setting frequency

2: voltage output

3: output current flow

4: power output

5: voltage EDC

6:feedback PID

7: temperature

8: S terminals functional

9: Y terminals functional

10: running time

11: version ROM

F15 Language Selection	setting limits: 0～2	Default value: 0

Notice!

Only LCD manipulator has this functional code

0: Display Chinese

1: Display English

2: Display Russian

G01 error history1	setting limits：read only	factory value：NC
G02 error history2	setting limits：read only	factory value：NC
G03 error history3	setting limits：read only	factory value：NC
G04 error history4	setting limits：read only	factory value：NC

Notice!

Only LCD manipulator has this functional code to display historical information of four failures before power off.

*1 represents: Upper limit and default value of voltage, double under 400V.

*2 represents: The rated current range of motor is 10%～200% of that of AC motor driver.

*3 represents: The default value will be different according to the capacity of AC motor driver.

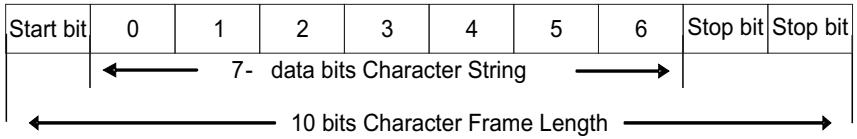
*4 represents: read-only value

Ec5000 Series of AC Motor Driver adopts the communication protocol of Modbus networks. Modbus can adopt two data coding modes: either ASCII (American Standard Code for Information Interchange) or RTU (Remote Terminal Unit). ASCII coding transmits data after converting the data into ASCII codes, while RTU transmits data directly without conversion. The following demonstrates the coding method of ASCII data format.Each byte is consisting of 2 ASCII characters. For example: Value 64 Hex can be represented by "64' in ASCII, i.e., '6' (36Hex) and '4' (34Hex). The following is a mapping table of ASCII Characters '0'… '9', 'A'… 'F'.

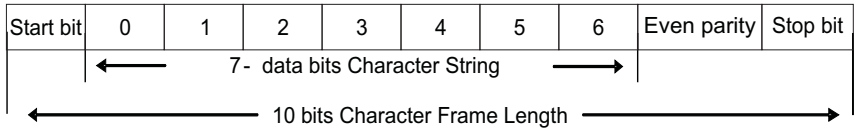
Character	'0'	'1'	'2'	'3'	'4'	'5'	'6'	'7'
ASCII code	30H	31H	32H	33H	34H	35H	36H	37H
Character	'8'	'9'	'A'	'B'	'C'	'D'	'E'	'F'
ASCII code	38H	39H	41H	42H	43H	44H	45H	46H

6.1 Communication Data Structure:

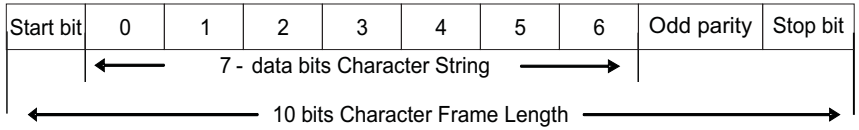
(1)7N2 For ASCII F03=0



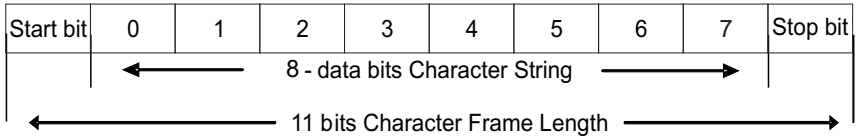
(2)7E1 For ASCII F03=1



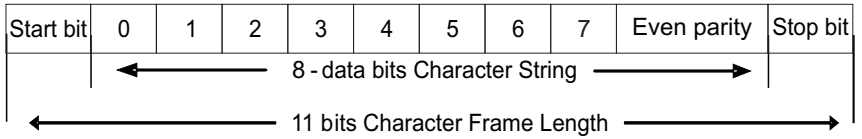
(3)7O1 For ASCII F03=2



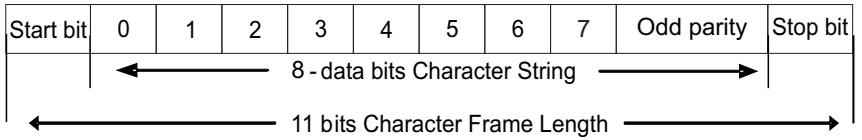
(4)8N1 For RTU F03=3



(5)8E1 For RTU F03=4



(6)8O1 For RTU F03=5



6.2 Data Format Frame

■ASCII Mode:

STX	Starting Character = ': ' (3AH)
Address Hi	Communication Address:
Address Lo	8-bit address consisting of 2 ASCII codes
Function Hi	Function Code:
Function Lo	8-bit function code consisting of 2 ASCII codes
DATA (n -1)	Data Content:
…….	n×8-bit data content consisting of 2n ASCII codes
DATA 0	n<=20, maximally 40 ASCII codes(twenty data)
LRC CHK Hi	LRC Check Code:
LRC CHK Lo	8-bit check code consisting of 2 ASCII codes
END Hi	Ending Character:
END Lo	END Hi = CR (0DH), END Lo = LF(0AH)

■RTU Mode:

START	Keep the no input signal for 10 ms or above
Address	Communication Address: 8-bit binary address
Function	Function Code:-8bit binary address
DATA (n -1)	Data Content:
…….	n-×8bit Data, n<=40(twenty 16-bit data)
DATA 0	
CRC CHK Low	CRC Check code:
CRC CHK High	16-bit CRC Check code consisting of 2 8-bit Binary
END	Keep the no input signal for 10 ms or above

6.2.1 Communication Address (Address)

00H: Broadcast to all drivers;

01H: To driver with Address 01;

0FH: To driver with Address 15;

10H: To driver with Address 16, and so on, the maximal address can be 254(FEH).

6.2.2 Function Code (Function) and Data Content (Data Characters)

03H: Read the register;

06H: Write data to the register;

08H: Loop detection;

10H: Write several data in succession;

■ 03H: Read several data to register

Function Code 03H: Read register (maximally, twenty continuous data can be read at the same time)

For example: as for driver with Address 01H, two continuous data in register can be represented as follows: Starting register Address 2102H

1.ASCII Mode:

Inquiry Message Character String Forma

STX	‘: ’
Address	‘0’
	‘1’
Function	‘0’
	‘3’
Starting address	‘0’
	‘0’
	‘1’
	‘D’
Number of data (count by word)	‘0’
	‘0’
	‘0’
	‘2’
LRC Check	‘D’
	‘D’
END	CR
	LF

Response Message Character String Format:

STX	‘: ’
Address	‘0’
	‘1’
Function	‘0’
	‘3’
Number of data (count by byte)	‘0’
	‘4’
Content of starting Address 001DH	‘1’
	‘7’
	‘7’
	‘0’
Content of address 001EH	‘0’
	‘0’
	‘0’
	‘0’
LRC Check	‘7’
	‘1’

2.RTU Mode:

Inquiry Message Format:

Address	01H
Function	03H
Content of data address 001DH	00H
	1DH
Number of data(count by word)	00H
	02H
CRC CHK Low	54H
CRC CHK High	0DH

Response Message Format:

Address	01H
Function	03H
Number of data (count by byte)	04H
Content of data address 001DH	17H
	70H
Content of data address 001EH	00H
	00H
CRC CHK Low	FEH
CRC CHK High	5CH

■ Function Code 06H: Write data to register

For example: as for Driver with Address 01H, write 6000(1770H) to the internal setting parameter of driver 001DH

1.ASCII Mode:

Inquiry Message Format:

STX	':'
Address	'0'
	'1'
Function	'0'
	'6'
Data address	'0'
	'0'
	'1'
	'D'
Data content	'1'
	'7'
	'7'
	'0'
LRC Check	'9'
	'0'
END	CR
	LF

Response Message Format

STX	':'
Address	'0'
	'1'
Function	'0'
	'6'
Data address	'0'
	'0'
	'1'
	'D'
Data content	'1'
	'7'
	'7'
	'0'
LRC C heck	'9'
	'0'
END	CR
	LF

2. RTU Mode:

Inquiry Message Format:

Address	01H
Function	06H
Data address	00H
	1DH
Data content	17H
	70H
CRC CHK Low	17H
CRC CHK High	D8H

Response Message Format:

Address	01H
Function	06H
Data address	00H
	1DH
Data content	17H
	70H
CRC CHK Low	17H
CRC CHK High	D8H

■ Command Code: 08H, Communication Loop Test

This command is used to test the communication status between the controller device (usually PC or PLC) and drivers, and the drivers will send The data content received back to the controller device without any operation.

1. ASCII Mode:

Inquiry Message Format:

STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'0'
CMD 0	'8'
Data	'0'
	'0'
	'0'
	'0'
Data	'1'
	'7'
	'7'
	'0'
LRC Check	'7'
	'0'
END	CR
	LF

Response Message Format:

STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'0'
CMD 0	'8'
Data	'0'
	'0'
	'0'
	'0'
Data	'1'
	'7'
	'7'
	'0'
LRC Check	'7'
	'0'
END	CR
	LF

2.RTU Mode:

Inquiry Message Format:

ADR	01H
CMD	08H
Data	00H
	00H
Data	17H
	70H
CRC CHK Low	8EH
CRC CHK High	0EH

Response Message Format:

ADR	01H
CMD	08H
Data	00H
	00H
Data	17H
	70H
CRC CHK Low	8EH
CRC CHK High	0EH

■ Command Code: 10H, Write several data in succession

For example: Change the multiple speed setting of driver (Address 01H) 001DH=50.00(1388H) and 001EH=40.00(0FA0H)

1. ASCII Mode:

Inquiry Message Format:

STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'1'
CMD 0	'0'
Data Starting Address	'0'
	'0'
	'1'
	'D'
Data Quantity (Word)	'0'
	'0'
	'0'
	'2'
Data Quantity (Byte)	'0'
	'4'
First Data	'1'
	'3'
	'8'
	'8'
Second Data	'0'
	'F'
	'A'
	'0'
LRC Che ck	'8'
	'2'
END	CR
	LF

Response Message Format :

STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'1'
CMD 0	'0'
Data Starting Address	'0'
	'0'
	'1'
	'D'
Data Quantity (Word)	'0'
	'0'
	'0'
	'2'
LRC Check	'D'
	'0'
END	CR
	LF

2.RTU Mode:

Inquiry Message Format:

ADR	01H
CMD	10H
Data Starting Address	00H
	1DH
Data Quantity (Word)	00H
	02H
Data	04H
First Data	13H
	88H
Second Data	0FH
	A0H
CRC Check Low	B2
CRC Check High	1C

Response Message Format:

ADR	01H
CMD	10H
Data Starting Address	00H
	1DH
Data Quantity (Word)	00H
	02H
CRC Check Low	D1
CRC Check High	CE

6.3 Check Value:

■Check Code (LRC Check) of ASCII Mode

Check code (LRC Check) is the sum added from of address to the end of data content.

For example: for the Check code of inquiry message in 3.3.1

01H + 03H + 21H + 02H + 00H + 02H = 29H, then take the complement of "2", and we get D7H.

■ Check code (CRC Check) of RTU Mode

Check code is calculated from address to the end of data content. The Operation rules are as follows:

Step 1: Set 16 bit register (CRC register) = FFFFH.

Step 2: Perform "Exclusive OR" on the first 8-bit byte message instruction and lower 16-bit CRC register and save the value obtained to CRC register.

Step 3: Right Shift CRC register and set the most significant bit with "0";

Step 4: Check the value after right shift: if it is "0", save the new value obtained in Step 3 to CRC register, or, Exclusive OR A001H and CRC register, and then save the result to CRC register.

Step 5: Repeat Step 3~Step 4, finish the operation of all 8-bit;

Step 6: Repeat Step 2~Step 5, take the next 8-bit message instruction, until all message instructions have been calculated. Finally, the CRC register value is the check code of CRC. Note: The check code of CRC must be put in the check code of message instruction in an exchange matter

■ In C language, the following function, which requires two parameters, produces the CRC value.

Unsigned char data Index in message buffer

Unsigned char lengh Byte quantity in message buffer

This function returns CRC value in the form of unsigned integer.

```
unsigned int crc_chk(unsigned char data,unsigned char lengh)
        {int j;
        unsigned int reg_crc=0xffff;
        while (lengh--){
        reg_crc^=*data=++;
        for(j=0;j<8;j++={
              if(reg_crc&0×01){/*LSB(b0)=1*/
          reg_crc=(reg_crc>>1)^0xa001;
          }else{
          reg_crc=reg_crc>>1;
        }
         }
          }
            return reg_crc;
          }
```


6.4 Definitions of Parameter Word Address in Communication Protocol

Definition	Parameter Word Address	Function Description	
Internal Setting Parameters of Driver	0nnnH	"nnn" represents the configurable parameter(Please refer to Appendix 1)	
Commands for Driver	2000H	Bit0	0:STOP 1:RUN
		Bit1	0:FWD 1:REV
		Bit2	0: Invalid 1 EF0
		Bit3	0: Invalid 1 RESET
		Bit4	0: Invalid 1 DO0
		Bit5	0: Invalid 1 DO1
		Bit6~15	Reserved
	2001H	MODBUS Frequency Command	
Monitoring Driver Status	2100H	Error code	
		01H=Uu1	
		02H=Uu2	
		03H=Uu3	
		04H=SC	
		05H=oC	
		06H=ou	
		07H=GF	
		08H=PUF	
		09H=oH1	
		0AH=oH2	
		0BH=oL1	
		0CH=oL2	
		0DH=oL3	
		0EH=EF0	

Definition	Parameter Word Address	Function Description	
Monitoring Driver Status	2100H	0FH=EF2	
		010H=EF3	
		012H=EF4	
		013H=EF5	
		014H=EF6	
		015H=SP|	
		016H=Spo	
		017H=CE	
		018H=rr	
		019H=Rh	
		01AH=oPr	
	2101H	Pre-warning Code	
		Bit0	UuWarning
		Bit1	ou Warning
		Bit2	OH1Warning
		Bit3	OL3Warning
		Bit4	BBWarning
		Bit5	EFWarning
		Bit6	SERR Warning
		Bit7	CALL Warning
		Bit8	OH3
		Bit9	CE
		Bit10	OPE0
		Bit11	OPE1
		Bit12	OPE2

Definition	Parameter Word Address	Function Description	
Monitoring Driver Status	2101H	Bit14~15	E=Reserved
	2102H	IO Status Code	
		Bit0	S1
		Bit1	S2
		Bit2	S3
		Bit3	S4
		Bit4	S5
		Bit5	S6
		Bit6	S7
		Bit7	S8
		Bit8~9	Reserved
		Bit10	Y1
		Bit11	Y2
		Bit12	Y3
		Bit13	Y4
		Bit14~15	Reserved
	2103H	Running Status	
		Bit0	In Running
		Bit1	Reversed Running
		Bit2	AC motor driver ready
		Bit3	Fault
		Bit4	Inching Status
		Bit5	Pre-Warning
		Bit6~7	Reserved
		Bit8	Running Mode

Definition	Parameter Word Address	Function Description	
Monitoring Driver Status	2103H	Bit9	Running Mode
		Bit10	Running Mode
		Bit11	Running Mode
		Bit12	In frequency input, ENTER key is used for input.
		Bit13~15	Reserved
	2104H	Setting Frequency	
	2105H	Output Frequency	
	2106H	Output Current	
	2107H	Output Voltage	
	2108H	Output Power	
	2109H	EDC Voltage	
	210AH	PID Feedback	
	210BH	Radiator Temperature	
	210CH	ROM Version	
	210DH	Fault History1	
	210EH	Fault History2	
	210FH	Fault History3	
	2110H	Fault History4	

■Additional Response for Communication error:

When driver is connected for communication, if an error occurs, the driver will respond with error code and set the most significant bit (bit7) of command code to “1”. (i.e., Function code AND 80H) and respond to controller system to inform the occurrence of errors.

For example:

ASCII Mode:

Address	01H
Function	86H
Exception code	02H
CRC CHK Low	C3H
CRC CHK High	A1H

RTU Mode:

Addre ss	01H
Function	86H
Exception code	02H
CRC CHK Low	C3H
CRC CHK High	A1H

■Definition of Error Code:

Error Code	Description
01	Function Code Error: function codes can be recognized by driver (03H,06H,08H,10H) by driver;
02	Data Address Error: The Add ress of data can not be recognized by driver;
03	Data Content Value Error: Too large value of data content, which can not be recognized by driver;
04	Driver Fails to Handle: Driver fails to execute this command.

■ ommunication program of PC:

The following is a simple example of how to write a communication program for Modbus
ASCII mode on a PC by C language.

```
#include<stdio.h>
#include<dos.h>
#include<conio.h>
#include<process.h>
#define PORT  0x03F8    /* the address of COM1 */
/* the address offset value relative to COM1 */
#define THR    0x0000
#define RDR    0x0000
#define BRDL   0x0000
```

```
#define IER   0x0001
#define BRDH  0x0001
#define LCR   0x0003
#define MCR   0x0004
#define LSR   0x0005
#define MSR    0x0006
unsigned char rdat[60];
/* read 2 data from address 2102H of AC drive with address 1 */
unsigned char tdat[60]={':','0','1','0','3','2','1','0',’2', '0','0','0','2','D','7','\r','\n'};
 void main(){
 int i;
 outportb(PORT+MCR,0x08);          /* interrupt enable */
 outportb(PORT+IER,0x01);          /* interrupt as datain */
 outportb(PORT+LCR,(inportb(PORT+LCR) | 0x80));
 /* the BRDL/BRDH can be access as LCR.b7==1 */
 outportb(PORT+BRDL,12); /* set baudrate=9600, 12=115200/9600*/
 outportb(PORT+BRDH,0x00);                                    =1AH,
 outportb(PORT+LCR,0x06); /* set protocol, <7,N,2>=06H,<7,E,1>
                                  <7,O,1>=0AH,<8,N,2>=07H,<8,E,1>=1BH,
                                  <8,O,1>=0BH*/
for(i=0;i<=16;i++){
    while(!(inportb(PORT+LSR) & 0x20)); /* wait until THR empty */
    outportb(PORT+THR,tdat[i]);          /* send data to THR */
                    } i=0;
            while(!kbhit()){
              if(inportb(PORT+LSR) & 0x01){ /* b0==1, read data ready */
                rdat[i++]=inportb(PORT+RDR); /* read data form RDR */
```


7.1 List of actions to protect

The AC motor driver itself has the functions of overvoltage, low voltage and over-current alarms and protection. Once a failure occurs, the protective actions will work, the AC motor driver will stop the output, the abnormal contact will act, and the free operation of motor will stop. Please refer to the abnormality causes and solutions according to the shown abnormity information of AC motor driver. The abnormality records will be kept in the interior storage unit of AC motor driver (which can record the latest 4 abnormality conditions), and can be read on the digital operation panel or by communication via parameter reading.

7.1.1 List of fault display

error display	illustration	detail	error correction
Uu1	Low voltage in main circuit	Low voltage of main circuit during running. Test voltsge: about 190V or lower for 200V grade, 380V or lower for 400V grade.	check power connection wire. improve input voltage.
	Low voltage in control circuit	Low voltage of control circuit during running.	
	Connector error	AC motor drives during operation within the pre-charge.	
OC	Over current flow OC	AC motor driveroutput current over OC value.	checkl motor coil resistance. prolong accelerate /retard time. check motor insulation. check with multimeter.

error display	illustration	detail	error correction
SC	Output short -circuit (SC)	AC motor drive output current exceeds the current value of IGBT safety	Check U, V, W-phase output is short -circuit
oU	Over vol tage OU	main circuit DC voltage over OU value test voltage: 200V grade: about 400V 400V grade: about 800V	Prolong retard time increase braking resistance.
GF	Grounding error GF	AC motor driverground output current over AC motor driver rated current 50%	Check wire insulation between AC motor driverand motor.
FB	Main circuit error FB	DC circuit fuse is broken output transistor broken	Check broken transistor, loading capacity short circuit grounding.
◎**oH1**	Radiator overheat OH1	Transistor radiator temperature is over allowed value(radiator temperature≥OH1 test value) (about 95℃)	Check exhaust fan and the surrounding temperature.
oH2	Radiator overheat OH2	Transistor radiator temperature is over allowed value(radiator temperature≥OH2 test value) (about 105℃)	Check exhaust fan and the surending temperature.
oL1	Motor overload OL1	AC motor driver over motor overload capacity value	Check C18 parameter settings are reasonable
oL2	Motor overload OL2	AC motor driver output current is over motor overload capacity value	Reduce load capacity prolong accelerating time.
◎**oL3**	Over rotation momentof force testing OL3	AC motor driveroutput current is over rotation moment of force testvalue	Reduce load capacity prolong accelerating time.

error display	illustration	detail	error correction
EFLn	Error from RS485 general data wire	Error in control circuit	Check external control circuit.
EF2~8	the external fault of Terminal S2 ~ S8	Generated within the external control circuit failure	Check input terminals circumstances, if the terminal is not connected while fault signal, then the replacement of AC motor drive.
SPI	Current fluctuate too much	AC motor driver power input lack phase. unstable in input voltage	Check power in voltage. re-tighten the input terminal screw. Or adjusted basis SPI
SPo	Output lack phase	AC motor driver output lack phase.	Check output wire. Check motor impedance. Re-tighten the input terminal screw. Or adjusted basis SPO

error display	illustration	detail	error correction
◎CE	MEMOBUS transmition error	RS485 control data not received normally.	Check transmition facility or signal.
rH	Braking reactor component overheat	Supass braking reactor temperature over allowance.	Low down load capacity.
Err	Control circuit error 1（ERR）	Can not build connection between AC motor driver and digital operator 5 seconds after power is on. MPU external componet error(innitial).	input digital operator,connector. check control circuit wire. change control insert board.
EPF	EEPROM error（EPF）	AC motor driver control. Component error.	Change control insert board.

7.1.2 List of alarm display

display	Content	illustration
Uu	pressure enduring test	Not enough voltage tested when AC motor driver stops.
oU	overvoltage in stopping	Main circuit EDC voltage surpass overvoltage test standard when AC motor driver stops.

display	Content	illustration
oH1	radiator overheat	Select test in circumstance of radiator temperature≥OH1 test standard,AC motor driver continue running.
oL3	over rotation moment of force test	When AC motor driver output current ＞C24（overrotation moment of force test standard）, sellect over rotation moment of force, AC motor driver continue running.
bb	outside BB	External BB order input from control circuit terminal.
EF	light/opposite running order error	It is OFF when right/opposite running order input over 500ms.
CALL	RS485 transmition waiting	In circumstance of A03(operation mode sellection) ≥4, AC motor driver can not receive data flow from RS485 when power is on.
oH3	AC motor driver overheat alarm	AC motor driver overheat alarm signal input from control circuit terminal.
CE	RS485 transmition error	Sellect continue running when Rs485 transmition error data transmition break down.
VAF	KVA setting error	AC motor driver KVA setting error.
EFF	multi-function joint input setting error	Multi-function joint input terminal（B01-B07）has the following errors 1.Set 2 or more same value. 2. Set 17 and 18 in same time. 3. Set 24 and 27 in same time.
VFE	V / f data setting error	A10-A16 (V/F data) setting error.
PAF	Data setting error	1.AC motor driver rated current0.1＞（C18）motor rated current or C18＞AC motor driver rated current2 2. A37(jump Frequency 1)≥A38(jump Frequency2)－A39(jumpFrequencyextent) 3. A35 (output Frequency up limits) ＜A36 (output Frequencylower limits)

Notice!

The alarm won't make the failure contact act, and the AC motor driver will return to the previous operation status automatically after the failure is solved. The table above explains the various alarms.

7.2Reset Alarm

■When a failure is detected about EC5000, the failure will be shown on the digital manipulator, and the abnormal contact will have output and the motor will slide to stop. Check the failure causes in the table below and take corrective measures.

■If the mentioned inspection and corrective measures can't solve the problem, please directly contact with our company.

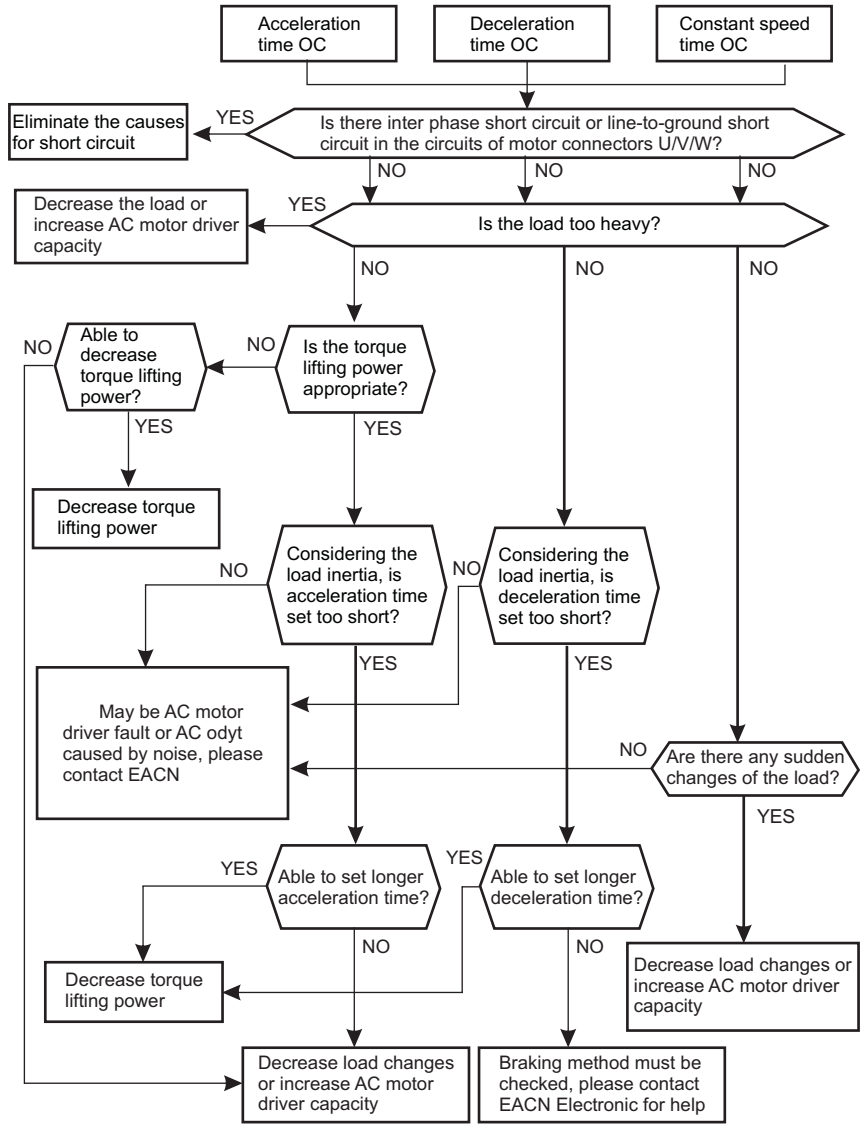
■For restart, connect with the resetting input signal or press RESET or disconnect the power supply of the main loop for one time, to reset the failure status

■If you want to alter the parameters in the failure indication, please press PRG

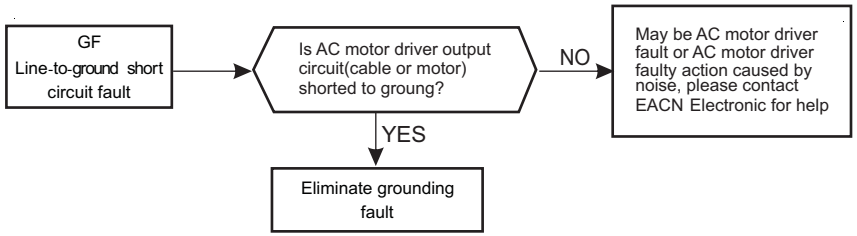
Notice!

When inputting the positive (reverse) operation instruction, the AC motor driver fails to receiver the failure resetting signal. You must cut off the positive (reverse) operation instruction first, and then reset.

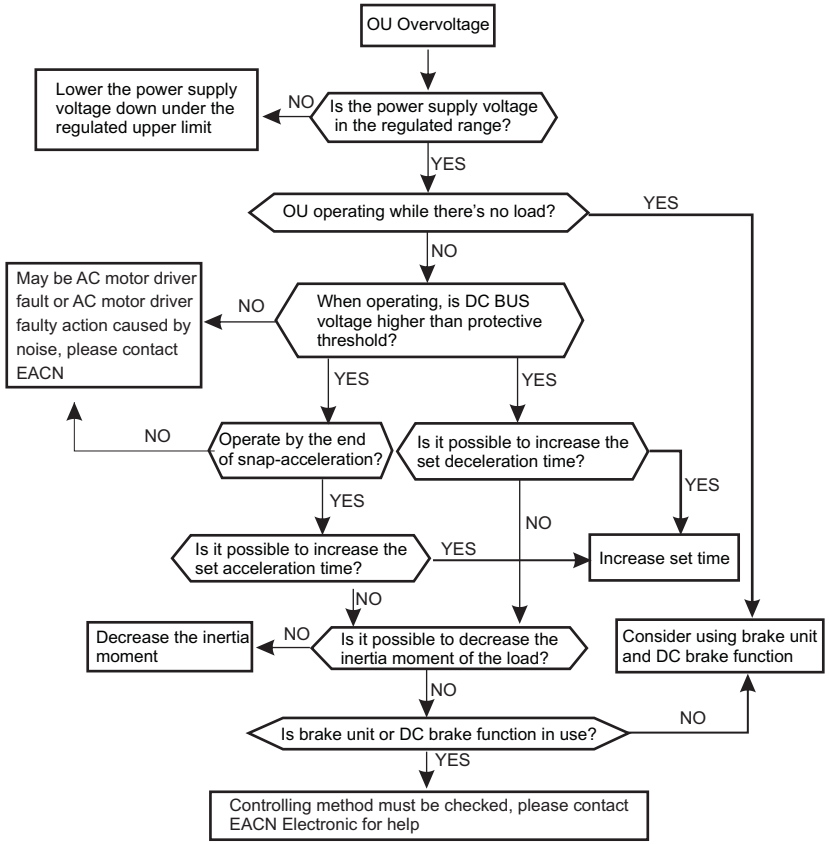
8.1 Over-Current(OC)


Acceleration time OC
Deceleration time OC
Constant speed time OC
Is there inter phase short circuit or line-to-ground short circuit in the circuits of motor connectors U/V/W?
YES
Eliminate the causes for short circuit
NO
Is the load too heavy?
YES
Decrease the load or increase AC motor driver capacity
Is the torque lifting power appropriate?
Able to decrease torque lifting power?
Decrease torque lifting power
Considering the load inertia, is acceleration time set too short?
Considering the load inertia, is deceleration time set too short?
May be AC motor driver fault or AC odyt caused by noise, please contact EACN
Are there any sudden changes of the load?
Able to set longer acceleration time?
Able to set longer deceleration time?
Decrease load changes or increase AC motor driver capacity
Braking method must be checked, please contact EACN Electronic for help

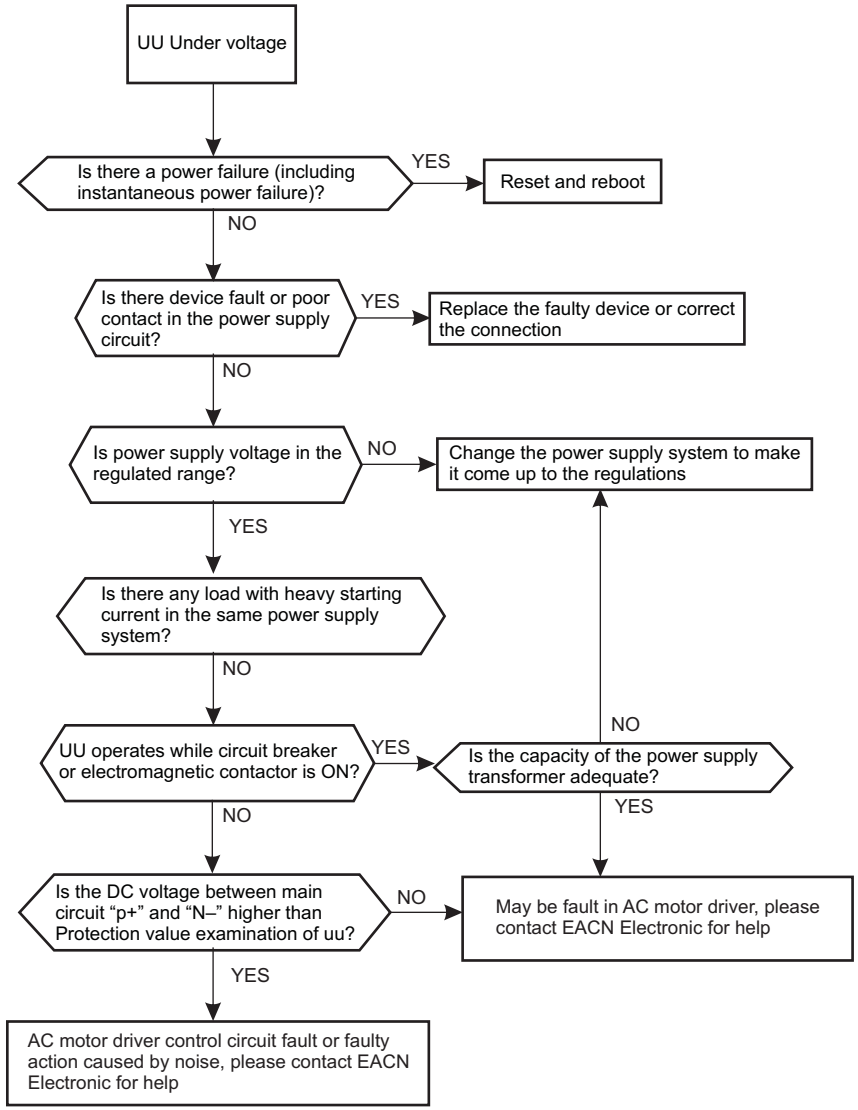
8.2 Grounding Fault (GF)


GF
Line-to-ground short circuit fault
Is AC motor driver output circuit(cable or motor) shorted to groung?
NO
May be AC motor driver fault or AC motor driver faulty action caused by noise, please contact EACN Electronic for help
YES
Eliminate grounding fault

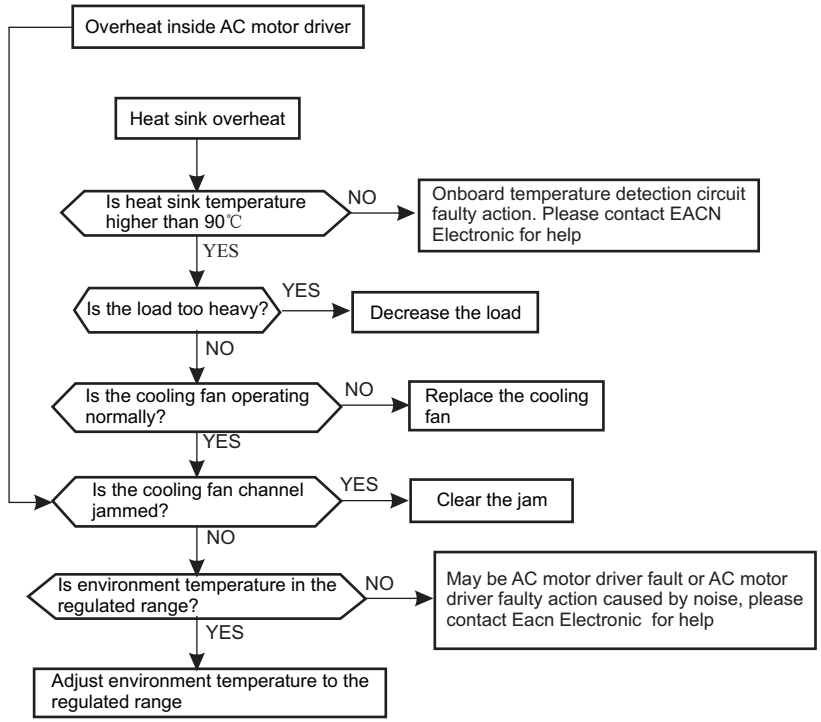
8.3 OverVoltage(OU)


OU Overvoltage
Lower the power supply voltage down under the regulated upper limit
NO
Is the power supply voltage in the regulated range?
YES
OU operating while there's no load?
YES
NO
May be AC motor driver fault or AC motor driver faulty action caused by noise, please contact EACN
NO
When operating, is DC BUS voltage higher than protective threshold?
YES
YES
NO
Operate by the end of snap-acceleration?
Is it possible to increase the set deceleration time?
YES
YES
NO
YES
Is it possible to increase the set acceleration time?
YES
Increase set time
NO
Decrease the inertia moment
NO
Is it possible to decrease the inertia moment of the load?
Consider using brake unit and DC brake function
NO
NO
Is brake unit or DC brake function in use?
YES
Controlling method must be checked, please contact EACN Electronic for help

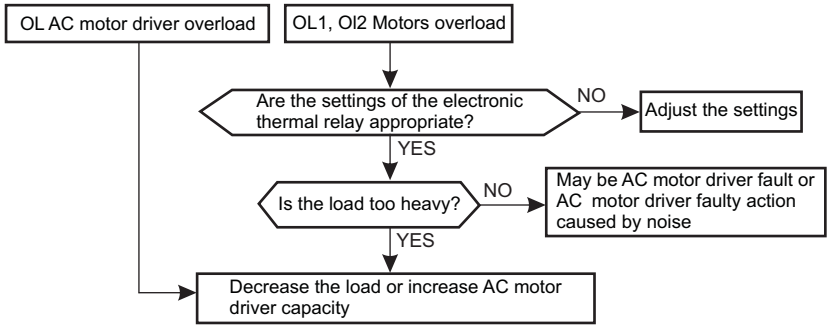
8.4 Under Voltage(UU)


UU Under voltage
Is there a power failure (including instantaneous power failure)?
YES
Reset and reboot
NO
Is there device fault or poor contact in the power supply circuit?
YES
Replace the faulty device or correct the connection
NO
Is power supply voltage in the regulated range?
NO
Change the power supply system to make it come up to the regulations
YES
Is there any load with heavy starting current in the same power supply system?
NO
UU operates while circuit breaker or electromagnetic contactor is ON?
YES
NO
Is the capacity of the power supply transformer adequate?
NO
YES
Is the DC voltage between main circuit "p+" and "N–" higher than Protection value examination of uu?
NO
May be fault in AC motor driver, please contact EACN Electronic for help
YES
AC motor driver control circuit fault or faulty action caused by noise, please contact EACN Electronic for help

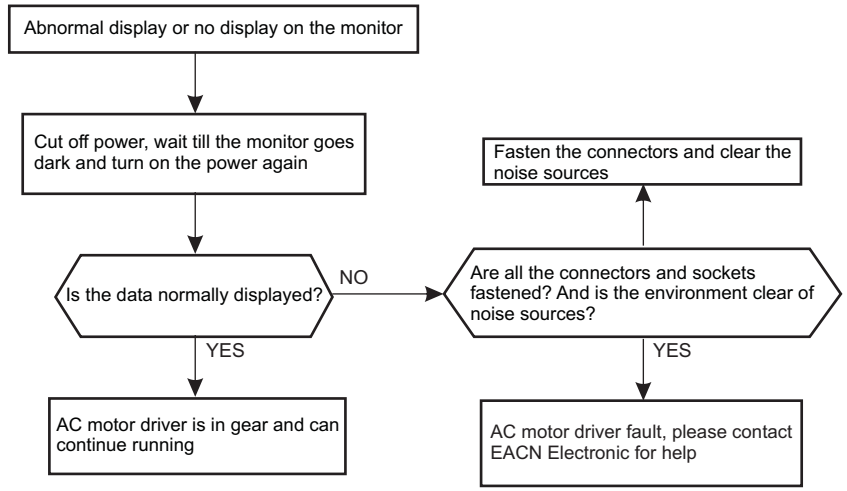
8.5 OverHeat(OH)


Overheat inside AC motor driver
Heat sink overheat
Is heat sink temperature higher than 90℃
NO
Onboard temperature detection circuit faulty action. Please contact EACN Electronic for help
YES
Is the load too heavy?
YES
Decrease the load
NO
Is the cooling fan operating normally?
NO
Replace the cooling fan
YES
Is the cooling fan channel jammed?
YES
Clear the jam
NO
Is environment temperature in the regulated range?
NO
May be AC motor driver fault or AC motor driver faulty action caused by noise, please contact Eacn Electronic for help
YES
Adjust environment temperature to the regulated range

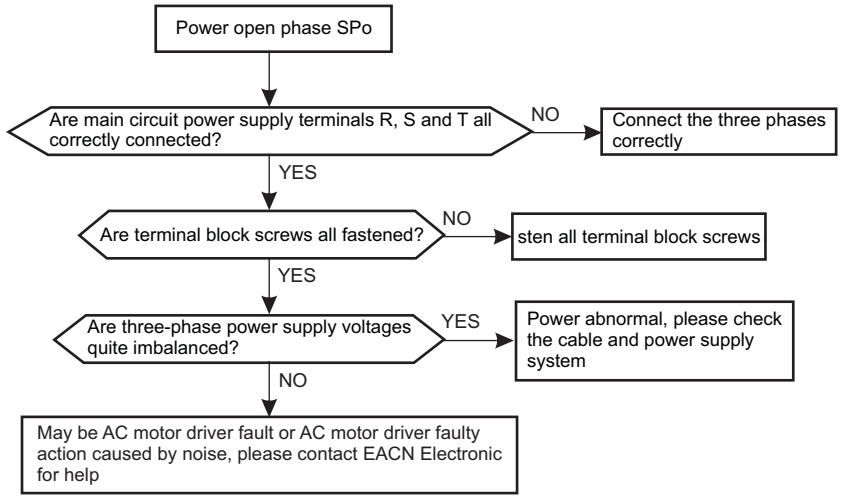
8.6 OL OverLoad(OL)


OL AC motor driver overload
OL1, Ol2 Motors overload
Are the settings of the electronic thermal relay appropriate?
NO
Adjust the settings
YES
Is the load too heavy?
NO
May be AC motor driver fault or AC motor driver faulty action caused by noise
YES
Decrease the load or increase AC motor driver capacity

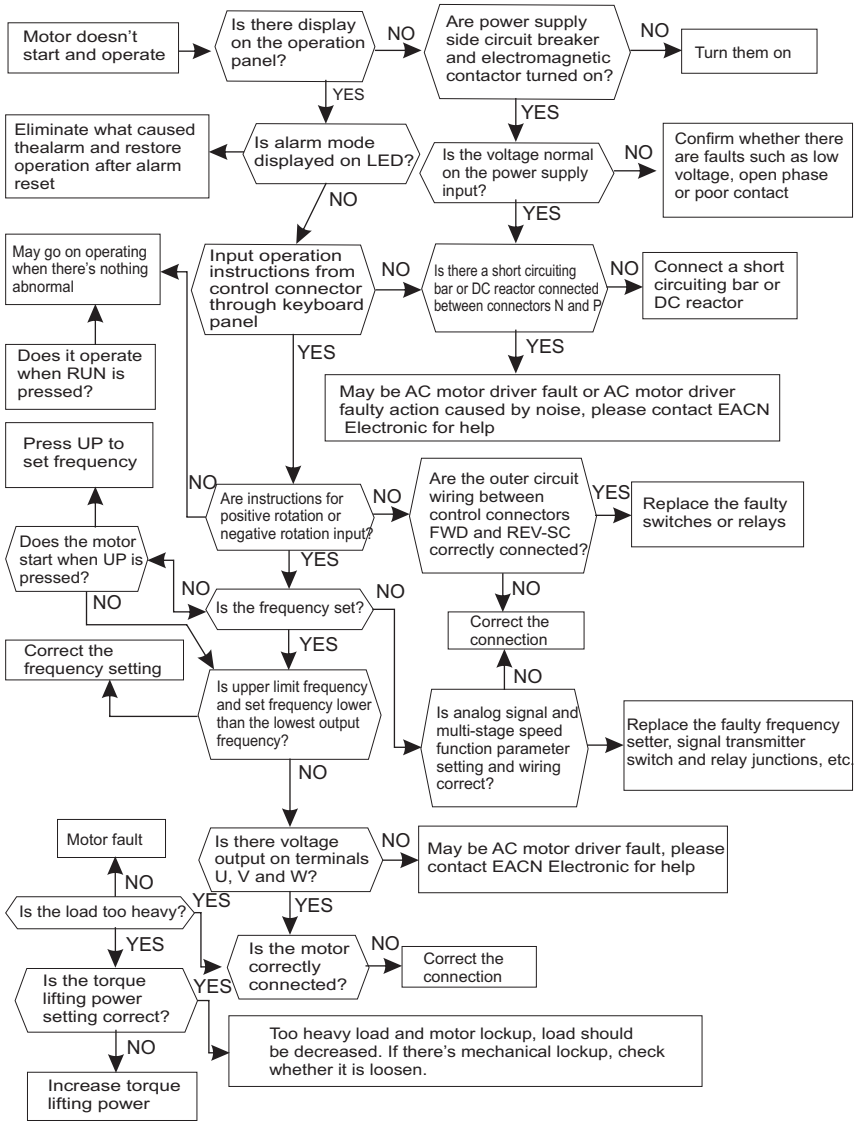
8.7 Panel Abnormal


Abnormal display or no display on the monitor
Cut off power, wait till the monitor goes dark and turn on the power again
Is the data normally displayed?
NO
Are all the connectors and sockets fastened? And is the environment clear of noise sources?
Fasten the connectors and clear the noise sources
YES
AC motor driver is in gear and can continue running
YES
AC motor driver fault, please contact EACN Electronic for help

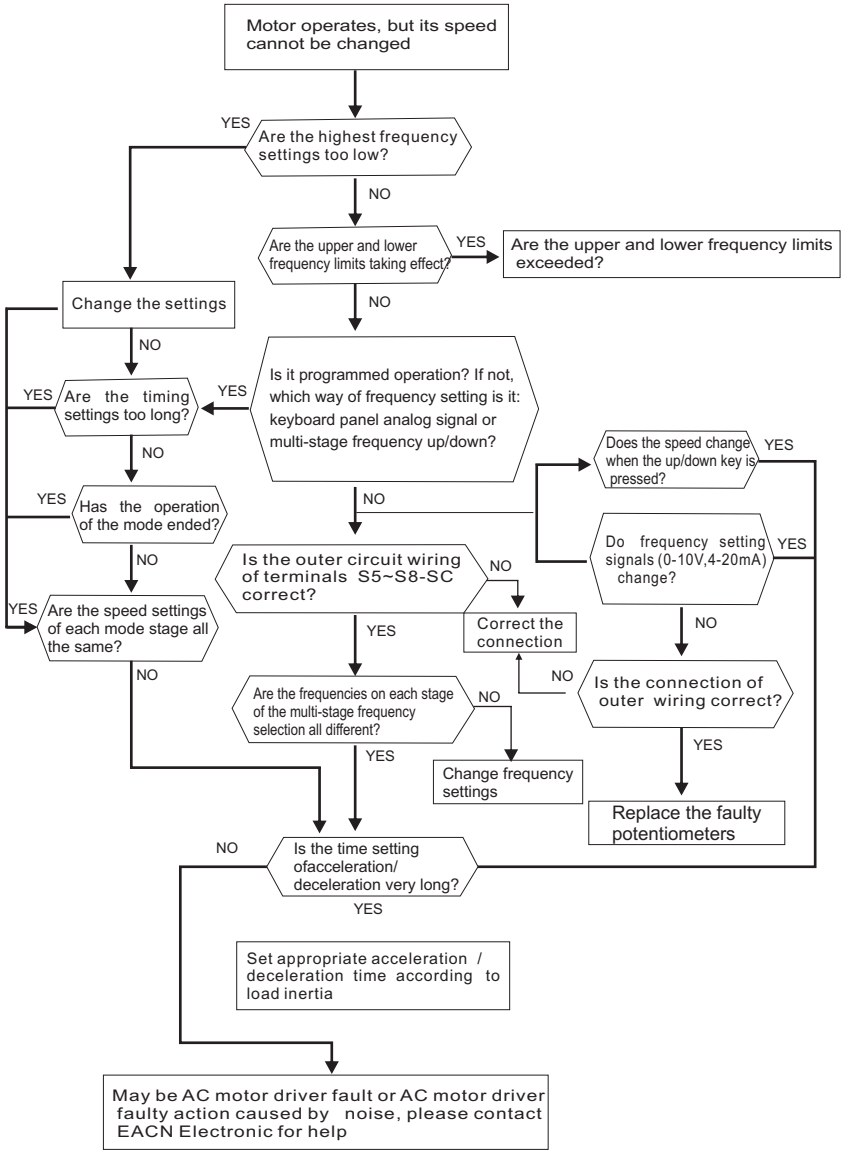
8.8 SPI Open Phase (SPo)


Power open phase SPo
Are main circuit power supply terminals R, S and T all correctly connected?
NO
Connect the three phases correctly
YES
Are terminal block screws all fastened?
NO
sten all terminal block screws
YES
Are three-phase power supply voltages quite imbalanced?
YES
Power abnormal, please check the cable and power supply system
NO
May be AC motor driver fault or AC motor driver faulty action caused by noise, please contact EACN Electronic for help

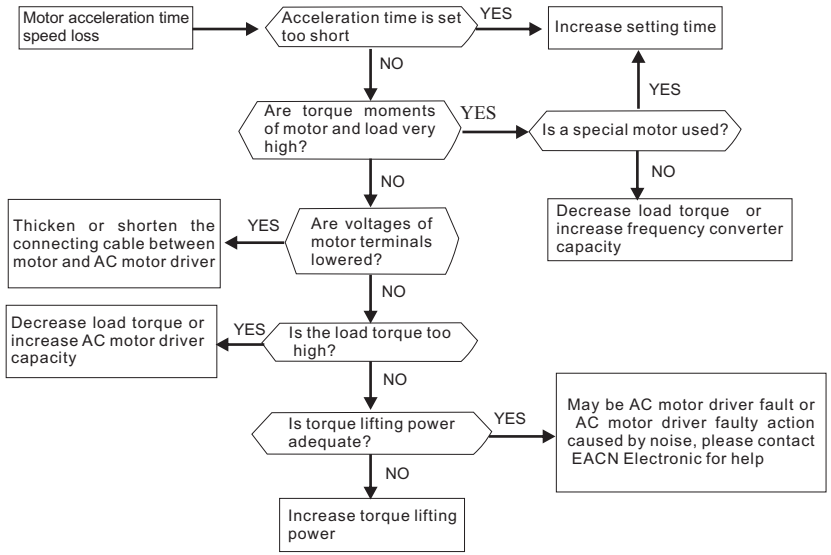
8.9 Motor Cannot Operate


Motor doesn't start and operate
Is there display on the operation panel?
NO
Are power supply side circuit breaker and electromagnetic contactor turned on?
NO
Turn them on
YES
YES
Eliminate what caused thealarm and restore operation after alarm reset
Is alarm mode displayed on LED?
Is the voltage normal on the power supply input?
NO
Confirm whether there are faults such as low voltage, open phase or poor contact
NO
YES
May go on operating when there's nothing abnormal
Input operation instructions from control connector through keyboard panel
NO
Is there a short circuiting bar or DC reactor connected between connectors N and P
NO
Connect a short circuiting bar or DC reactor
Does it operate when RUN is pressed?
YES
YES
May be AC motor driver fault or AC motor driver faulty action caused by noise, please contact EACN Electronic for help
Press UP to set frequency
NO
Are instructions for positive rotation or negative rotation input?
NO
Are the outer circuit wiring between control connectors FWD and REV-SC correctly connected?
YES
Replace the faulty switches or relays
Does the motor start when UP is pressed?
YES
NO
NO
Is the frequency set?
NO
Correct the connection
Correct the frequency setting
YES
NO
Is upper limit frequency and set frequency lower than the lowest output frequency?
Is analog signal and multi-stage speed function parameter setting and wiring correct?
Replace the faulty frequency setter, signal transmitter switch and relay junctions, etc.
NO
Motor fault
Is there voltage output on terminals U, V and W?
NO
May be AC motor driver fault, please contact EACN Electronic for help
NO
YES
YES
Is the load too heavy?
YES
Is the motor correctly connected?
NO
Correct the connection
Is the torque lifting power setting correct?
YES
Too heavy load and motor lockup, load should be decreased. If there's mechanical lockup, check whether it is loosen.
NO
Increase torque lifting power

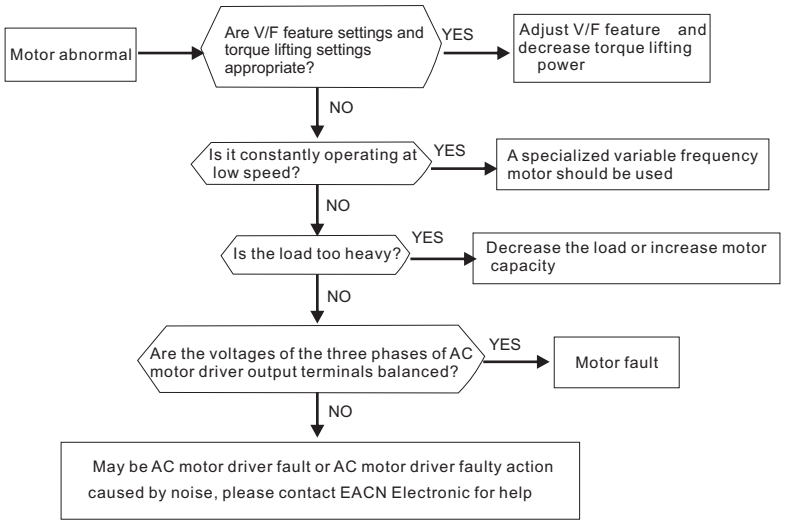
8.10 Motor Speed Cannot Change


Motor operates, but its speed cannot be changed
YES
Are the highest frequency settings too low?
NO
Are the upper and lower frequency limits taking effect?
YES
Are the upper and lower frequency limits exceeded?
NO
Change the settings
NO
Is it programmed operation? If not, which way of frequency setting is it: keyboard panel analog signal or multi-stage frequency up/down?
YES
YES
Are the timing settings too long?
NO
YES
Has the operation of the mode ended?
NO
YES
Are the speed settings of each mode stage all the same?
NO
NO
Is the outer circuit wiring of terminals S5~S8-SC correct?
NO
Correct the connection
YES
Are the frequencies on each stage of the multi-stage frequency selection all different?
NO
Change frequency settings
YES
Does the speed change when the up/down key is pressed?
YES
Do frequency setting signals (0-10V,4-20mA) change?
YES
NO
Is the connection of outer wiring correct?
NO
YES
Replace the faulty potentiometers
NO
Is the time setting ofacceleration/ deceleration very long?
YES
Set appropriate acceleration / deceleration time according to load inertia
May be AC motor driver fault or AC motor driver faulty action caused by noise, please contact EACN Electronic for help

8.11 Motor Speed Loss


Motor acceleration time speed loss
Acceleration time is set too short
YES
Increase setting time
NO
YES
Are torque moments of motor and load very high?
YES
Is a special motor used?
NO
NO
Decrease load torque or increase frequency converter capacity
Thicken or shorten the connecting cable between motor and AC motor driver
YES
Are voltages of motor terminals lowered?
NO
Decrease load torque or increase AC motor driver capacity
YES
Is the load torque too high?
NO
Is torque lifting power adequate?
YES
May be AC motor driver fault or AC motor driver faulty action caused by noise, please contact EACN Electronic for help
NO
Increase torque lifting power

8.12 Motor Abnormal


Motor abnormal
Are V/F feature settings and torque lifting settings appropriate?
YES
Adjust V/F feature and decrease torque lifting power
NO
Is it constantly operating at low speed?
YES
A specialized variable frequency motor should be used
NO
Is the load too heavy?
YES
Decrease the load or increase motor capacity
NO
Are the voltages of the three phases of AC motor driver output terminals balanced?
YES
Motor fault
NO
May be AC motor driver fault or AC motor driver faulty action caused by noise, please contact EACN Electronic for help

AC motor driver consists of multiple parts including electronic parts such as ICs, resistors, capacitors and transistors as well as cooling fans and relays. These parts aren't permanently durable and cannot be used forever. Even if used under normal circumstance, once the life period has passed, faults are likely to occur. Therefore, preventive periodic spot check is necessary, in order to find out the parts with poor quality or those fall short of the standard, and eliminate the causes for AC motor driver malfunction. At the same time, the parts that have exceeded their life period could also be replaced, so as to ensure fine operation.

9.1 Daily Inspections

During power-up and operation, without taking away the cover, examine the operation of AC motor driver with eye survey from outside and confirm that there's nothing abnormal. Usually, examine the following:

- ■whether the operation performance comes up to the regulation
- ■whether the environment comes up to the regulation
- ■whether keyboard panel display is abnormal
- ■whether without abnormal noises, vibrations and abnormal odor
- ■whether without abnormality such as overheat or change in col

9.2 Periodic Inspection

Before doing the periodic inspection, first stop operation, shut off power supply and take away the cover.

Even when the power supply of the AC motor driver is shut off, there's still charged voltage on the filter capacitors and it takes some time to discharge. In order to avoid the danger, be sure to wait until the charge indicator goes out and test with a voltmeter to ensure the voltage is lower than safe threshold(≦ 25Vdc) before the operation of inspection.

Notice!

1. For AC motor drivers≤22kW, wait 5 minutes after shutting down the power, and wait 10 minutes for those≥30kW. Not until the DC voltage between terminals N and P is lower than DC25V could examination operation with cover removed begin.

2. No one other than the appointed operators could perform maintenance and part replacement and other operations. (Metal objects such as watches and rings should be taken off before operation, and use tools with insulation in operation.)

3. Rebuilding the AC motor driver is absolutely forbidden.
4. Avoid electric shock and facility accident.

Periodic Inspection Schedule

■ **Environment**

Inspection Items	Inspection Method	Spot Check Period		
		Daily	Half-yearly	Yearly
Confirm environment temperature, humidity, vibration and whether there's dust, gas, oil mist and water drops.	With eye survey and apparatus measuring	■		
Are there any foreign bodies like tools or dangerous goods nearby?	With eye survey	■		

■ **Voltage**

Inspection Items	**Inspection Method**	Spot Check Period		
		Daily	Half-yearly	Yearly
Are voltages of main circuit and control circuit both normal?	Measure with a multimeter	■		

■ **Keyboard Display Panel**

Inspection Items	**Inspection Method**	Spot Check Period		
		Daily	Half-yearly	Yearly
Is the display clear?	With eye survey	■		
Is any character missing?		■		

■ **Mechanism Kits**

Inspection Items	**Inspection Method**	Spot Check Period		
		Daily	Half-yearly	Yearly
Isthere any abnormal sound or vibration?	With eye survey and hearing		■	
Are the bolts (fasteners) loose?	Fasten		■	
Is there any distortion and damage?	With eye survey		■	
Is there color change due to overheat?	With eye survey		■	
Is it stained with dust or defacement?	With eye survey		■	

■ **Main Circuit**

Inspection Items	**Inspection Method**	Spot Check Period		
		Daily	Half-yearly	Yearly
Have any bolts been loose and dropped off?	Fasten	■		
Is there distortion, crack, damage or color changedue to overheat and aging in the machine and insulation?	With eye survey		■	
Is it stained with dust or defacement?	With eye survey		■	

■ **Main Circuit-Terminals and Wiring**

Inspection Items	Inspection Method	Spot Check Period		
		Daily	Half-yearly	Yearly
Is there color change and distortion due to overheat in the conductor?	With eye survey		■	
Is there damage and color change in the wire coat?	With eye survey		■	

■ **Main Circuit—Terminals and Wiring**

Inspection Items	Inspection Method	Spot Check Period		
		Daily	Half-yearly	Yearly
Is there any damage?	With eye survey	■		

■ **Main Circuit-Terminal Blocks**

Inspection Items	**Inspection Method**	Spot Check Period		
		Daily	Half-yearly	Yearly
Is there leakage, color change, crack and shell inflation?	With eye survey	■		
Has the safety valve come out? Is there significant inflation in the valve?	With eye survey	■		
Measure static capacity according to the need		■		

■ **Main Circuit—Filter Capacitor**

Inspection Items	**Inspection Method**	Spot Check Period		
		Daily	Half-yearly	Yearly
Is there abnormal odor or crackle in the insulator due to overheat?	With smelling and eye survey	■		
Is there any broken wire?	With eye survey, or open the connection at one end and measure with a multimeter	■		

■ **Main Circuit—Resistor**

Inspection Items	**Inspection Method**	Spot Check Period		
		Daily	Half-yearly	Yearly
Is there abnormal noise of vibration or odor?	With hearing, eye survey and smelling	■		

■ **Main Circuit—Transformer and Reactor**

Inspection Items	**Inspection Method**	Spot Check Period		
		Daily	Half-yearly	Yearly
Is there noise of vibration while operating?	With hearing	■		
Are the junctions well connected?	With eye survey	■		

■ **Main Circuit—Terminals and Wiring**

Inspection Items	Inspection Method	Spot Check Period		
		Daily	Half-yearly	Yearly
Are the bolts and connectors loose?	Fasten		■	
Is there abnormal odor or color change?	With smelling and eye survey		■	
Are there cracks, damage, distortion or significant corrosion?	With eye survey		■	
Is there leakage or traces of distortion in the capacitors?	With eye survey		■	

■ **Control Circuit－Control PCB Connector**

Inspection Items	Inspection Method	Spot Check Period		
		Daily	Half-yearly	Yearly
Is there abnormal noise or vibration?	With hearing, eye survey and turn with hand (must cut off the power)		■	
Are the bolts loose?	Fasten		■	
Is there color change due to overheat?			■	

■ **Cooling System—Cooling Fans**

Inspection Items	**Inspection Method**	Spot Check Period		
		Daily	Half-yearly	Yearly
Is there any jam or adhered substance in the air intake or Exhaust of the heat sink?	With hearing		■	

Notice!

Please wipe the stained areas with chemically neutral cleaning cloth. Sweep the dust with electric cleaner.

Appendix A-1 Product Specifications

Product Standard Specifications Schedule

Model	Input Voltage	Power G/P(KW)	Output Capacity KVA	Output Current G/P(A)	Suited Motors G/P(KW)
EC500D4G23	Single/Three Phase 200V 50Hz	0.4/-	1.0/-	3.2/-	0.4/-
EC50D75G23	Single/Three Phase 200V 50Hz	0.75/-	2.0/-	6/-	0.75/-
EC501D5G23	Single/Three Phase 200V 50Hz	1.5/-	2.4/-	8/-	1.5/-
EC502D2G23	Single/Three Phase 200V 50Hz	2.2/-	3.7/-	11/-	2.2/-
EC50D75G43	Three Phase 400V 50Hz	0.75/-	2.6/-	3.4/-	0.75/-
EC501D5G43	Three Phase 400V50Hz	1.5/-	3.7/-	4.8/-	1.5/-
EC502D2G43	Three Phase 400V 50Hz	2.2/-	4.2/-	6.2/-	2.2/-

Model	Input Voltage	Power G/P(KW)	Output Capacity KVA	Output Current G/P(A)	Suited Motors G/P(KW)
EC503D7G43	Three Phase 400V 50Hz	3.7/-	6.6/-	8.2/-	3.7/-
EC505D5G07D5P43	Three Phase 400V 50Hz	5.5/7.5	11/14	14/18	5.5/7.5
EC507D5G0011P43	Three Phase 400V 50Hz	7.5/11	14/21	18/27	7.5/11
EC50011G0015P43	Three Phase 400V 50Hz	11/15	21/26	27/34	11/15
EC50015G18D5P43	Three Phase 400V 50Hz	15/18.5	26/34	34/41	15/18.5
EC518D5G0022P43	Three Phase 400V 50Hz	18.5/22	31/40	41/52	18.5/22
EC50022G0030P43	Three Phase 400V 50Hz	22/30	40/50	52/65	22/30
EC50030G0037P43	Three Phase 400V 50Hz	30/37	50/61	65/80	30/37
EC50037G0045P43	Three Phase 400V 50Hz	37/45	61/73	80/96	37/45
EC50045G0055P43	Three Phase 400V 50Hz	45/55	73/98	96/128	45/55
EC50055G0075P43	Three Phase 400V 50Hz	55/75	98/130	128/165	55/75
EC50075G0090P43	Three Phase 400V 50Hz	75/90	130/153	165/185	75/90
EC50090G0110P43	Three Phase 400V 50Hz	90/110	153/170	185/224	90/110
EC50110G0132P43	Three Phase 400V 50Hz	110/132	170/211	224/260	110/132
EC50132G0160P43	Three Phase 400V 50Hz	132/160	211/230	260/302	132/160

Model	Input Voltage	G/P(KW)	Output Capacity KVA	Output Current G/P(A)	Suited Motors G/P(KW)
EC50160G0185P43	Three Phase 400V 50Hz	160/185	230/260	302/340	160/185
EC50185G0220P43	Three Phase 400V 50Hz	185/220	260/340	340/450	185/220
EC50220G0250P43	Three Phase 400V 50Hz	220/250	340/360	450/470	220/250
EC50250G0280P43	Three Phase 400V 50Hz	250/280	360/390	470/520	250/280
EC50280G0315P43	Three Phase 400V 50Hz	280/315	390/460	520/605	280/315
EC50315G0350P43	Three Phase 400V 50Hz	315/350	460/520	605/640	315/350

Appendix A-2 Product Technical Indexes

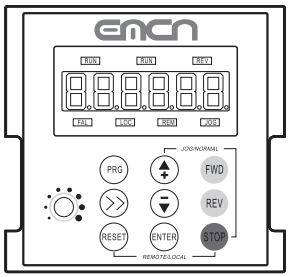
Series		EC5000
Input	Variation Tolerance of Rating Voltage and Frequency	400V/50Hz/60Hz, Voltage:±15%; Frequency:±5% 200V/50Hz/60Hz, Voltag e:±15%;Frequency:±5%
Output	Rating Voltage	Three Phase: 400V (proportional to input voltage) Three Phase: 200V (proportional to input voltage)
Controlling Features	Control Method	SVPWM
	Control Mode	V/F Control / Current Vector Control
	Torque Feature	With torque compensation and slip compensation, start torque can reach 150% at 1.0Hz
	Frequency Control Range	0.1 ~ 400Hz

Series		EC5000
Controlling Features	Frequency Precision (Temperature Changing)	Digital Instruction: ±0.01%(10℃~ 40℃)
		Analog Instruction: Max Frequency × 0.2%Hz (25℃ ±10%)
	Setting Resolution	Digital Instruction: 0.01Hz
		Analog Instruction: Max Frequency × 0.1%Hz
	Output Resolution	0.01 Hz
	Overload Capability	Generic Model(G): 150% rating output current for 1min Blower/Pump Model(P): 120% rating output current for 1min
	Frequency Setting Signal	0 ~ 10V(20kΩ), 0 -4 ~ 20mA 250Ω
	Acceleration/Deceleration Time	0.0~3600 seconds (acceleration/deceleration time shall be set respectively)
Series		EC5000
Performance	Braking Torque	About 20% without braking resistor, and about 125% with braking resistor.
	V/F Mode Classes	15 preset V/F modes and programmable V/F mode
	Overload Protection	Electronic thermal overload relay protection.
	Instantaneous OverCurrent	Generic Model(G): About 250% AC motor driver rating current Blower/Pump Model(P): About 200% AC motor driver rating current
	OverLoad	Generic Model(G): 150% rating output current for 1min before sliding stop Blower/Pump Model(P): 120% rating output current for 1min before sliding stop
	OverVoltage	Motor stops sliding when rectifier output voltage exceeds 410V (200V class) / 820V(400V class).

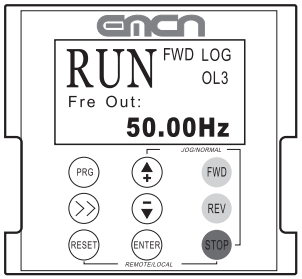
Series		EC5000
Performance	OverLoad	Generic Model(G): 150% rating output current for 1min before sliding stop Blower/Pump Model(P): 120% rating output current for 1min before sliding stop
	OverVoltage	Motor stops sliding when rectifier output voltage exceeds 410V (200V class) / 820V(400V class).
	UnderVoltage	Motor stops sliding when rectifier output voltage drops down to 190V (200V class) / 380V(400V class) or lower.
	Instantaneous Power -Failure Compensation	Instant stop when instantaneous power-failure lasts for 15ms or longer. (Default setting) According to standard setting, if the power - failure is shorter than 2 seconds, continue operation.
	Heat Sink Overheat	Thermistor protection, takes effect when temperature exceeds 105℃
	Speed Loss Protection	Speed loss protection during acceleration, deceleration and constant speed operation
	Grounding Failure	Electronic circuit protection, takes effect when leakage current reaches 50% of AC motor driver rating current.
Environment	Environment Temperature/Humidity	10℃ ~ 40℃ 90%RH and lower (no dewing)
	Operation Location	No higher than altitude 1000m above sea level, indoor (no corrosive gas, liquid, no dust)
	Storage Temperature	- 20℃ ~ 60 ℃
	Vibration	20Hz and below: 9.8m/s2(1G) 20 ~ 50Hz: 5.88m/s2(0.6G)
International Certification		CE

Appendix B–1 Optional Digital Operators and External Components

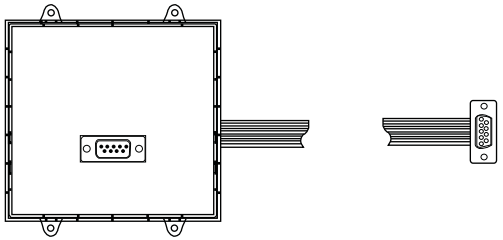
■ Nixie tube Operator PU-01



■ LCD Operator PU-02



■ External Component PUZ-01



Appendix B-2 Braking Resistor

Braking Resistor Selection schedule

AC Motor Driver Model	Resistor Specifications		Braking Torque%	Suited Motor /KW Model G	Suited Motor /KW Model P
	PowerW	Resistance O			
EC500D4G23	80	200	125	0.4	-
EC50D75G23	100	200	125	0.75	-
EC501D5G23	300	100	125	1.5	-
EC502D2G23	300	70	125	2.2	-
EC50D75G43	80	750	125	0.75	-
EC501D5G43	300	400	125	1.5	-
EC502D2G43	300	250	125	2.2	-
EC503D7G43	400	150	125	3.7	-
EC505D5G07D5P43	500	100	125	5.5	7.5
EC507D5G0011P43	1000	75	125	7.5	11
EC50011G0015P43	1000	50	125	11	15
EC50015G18D5P43	1500	40	125	15	18.5
EC518D5G0022P43	4800	32	125	18.5	22
EC50022G0030P43	4800	27.2	125	22	30
EC50030G0037P43	6000	20	125	30	37
EC50037G0045P43	9600	16	125	37	45
EC50045G0055P43	9600	14	125	45	55
EC50055G0075P43	12000	10	125	55	75
EC50075G0090P43	18000	7	125	75	90
EC50090G0110P43	18000	7	125	90	110
EC50110G0132P43	18000	7	125	110	132
EC50132G0160P43	36000	3.5	125	132	160
EC50160G0185P43	36000	3.5	125	160	185
EC50185G0220P43	36000	3.5	125	185	220
EC50220G0250P43	48000	3	125	220	250
EC50250G0280P43	48000	3	125	250	280
EC50280G0315P43	48000	3	125	280	315
EC50315G0350P43	48000	3	125	315	350

Notice!

1.To implement fast braking, AC motor drivers of specs 400V class, =18.5KW and higher need to install a braking unit.

2.Choose the resistances and operation frequencies set by us.

3.If braking resistors and braking modules other than provided by us are used and have caused AC motor driver or other devices damage, we will be of none responsibility.

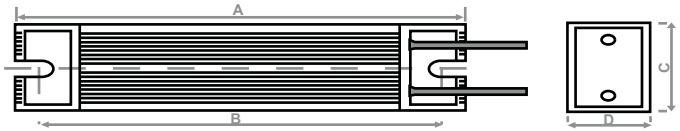
4.Please take environment safety especially flammability into consideration during the installation of braking resistors.

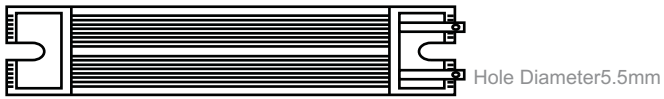
5.If you want to change the resistance and power, please contact local vendors.

6.You shall order separately if you need braking resistors and braking modules. Please contact local vendors for details.

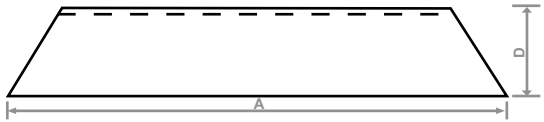
Selecting Resistors

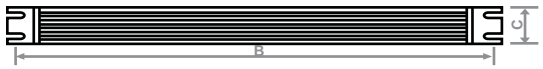
■Characteristics: Better weather-proof than traditional ceramic bone resistor. Can be used under industrial control circumstances with strict regulations and rough environment. Suitable for compact installation and easy to adhere heat sink





Picture A



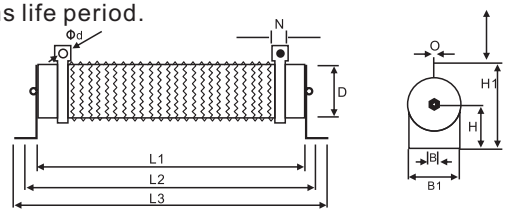


Picture B

Specifi-cations	power	outline deawing	Size(mm)			
			A	B	C	D
RXLG	60	Picture A	115	98	40	20
RXLG	80		140	123	40	20
RXLG	100		165	148	40	20
RXLG	120		190	173	40	20
RXLG	150		215	197	40	20
RXLG	200		165	147	60	30
RXLG	300		215	197	60	30
RXLG	400		365	247	60	30
RXLG	500		335	317	60	30
RXLG	800		400	382	61	59
RXLG	1000	Picture B	400	384	50	107
RXLG	1200		450	434	50	107
RXLG	1500		485	470	50	107
RXLG	2000		550	532	50	107

■ Rippled Resistor

Characteristics: Better heat dissipation and lowered parasitic inductance with standing ripples on the surface. Flame retarding inorganic coating effectively protects the resistance wire from oxidation and lengthens life period.



Rated power (W)	size(mm)										
	L1(±2)	L2(±5)	L3(±3)	D(±2)	B	B1	H	H1(±3)	N	¢N	O
50	102	124	146	28	6.5	28	28	61	10	4.5	1.2
60	102	124	146	28	6.5	28	28	61	10	4.5	1.2
80	152	174	196	28	6.5	28	28	61	10	4.5	1.2
100	182	204	226	28	6.5	28	28	61	10	4.5	1.2
120	182	204	226	28	6.5	28	28	61	10	4.5	1.2
150	195	217	239	40	8	40	41	81	12	5.5	2.0
200	195	217	239	40	8	40	41	81	12	5.5	2.0
300	282	304	326	40	8	40	41	81	12	5.5	2.0
400	282	304	326	40	8	40	41	81	12	5.5	2.0
500	316	338	360	50	8	50	45	101	16	6	2.0
600	345	367	389	40	8	40	41	81	12	5.5	2.0
750	316	338	360	50	8	50	45	101	16	6	2.0
1000	300	325	350	60	8.5	60	60	119	16	6	2.0
1200	415	440	465	60	8.5	60	60	119	16	6	2.0
1500	415	440	465	60	8.5	60	60	119	16	6	2.0
2000	510	535	560	60	8.5	60	60	119	16	6	2.0
2500	600	625	650	60	8.5	60	60	119	16	6	2.0

Notice!

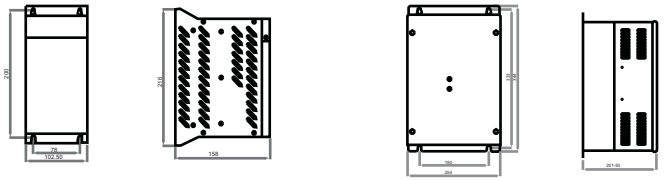
Power of the resistors described above is lower than 2500W, if you need high power resistors higher than 2000W, a braking resistance box is recommended. Please contact local vendors for details.

Appendix B-3 Braking Unit

Braking Unit Specifications:

PictureA:DBU2015/DBU2022/DBU2030/ DBU4030/DBU4045。

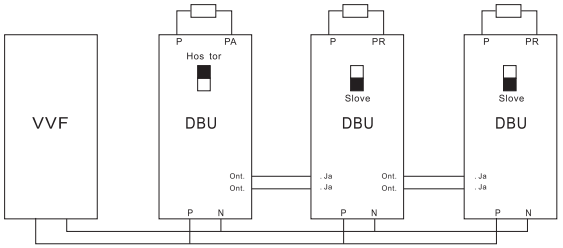
Picture B: DBU4220/DBU4300/DBU6220. Overall size and installation size



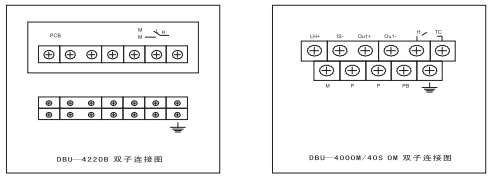
Picture A PictureB

Specifications Model	Rated Current	Max. current	Chopper voltage	Installation Size	Term inal	Weight	Wiring
DBU-2015	15A	50A	DC380V	φ6	M4	2.3	4-6
DBU-2022	25A	75A	DC380V	φ6	M4	2.3	4-6
DBU-2030	30A	90A	DC380V	φ6	M4	2.3	4-8
DBU-4030	15A	50A	DC630V/DC660V/DC690V/DC730V/DC760V	φ6	M4	2.3	4-6
DBU-4045	25A	75A	DC630V/DC660V/DC690V/DC730V/DC760V	φ6	M4	2.3	4-6
DBU-4220	80A	300A	DC630V/DC660V/DC690V/DC730V/DC760V	φ8	M8	11.6	16-36
DBU-6220	80A	300A	DC1000V/DC1050V/DC1100V/DC1150V/DC1200V	φ8	M8	11.6	16-36

Braking unit can be used in parallel, parallel approach as shown below, the number of proposals in parallel up to no more than 3 units.



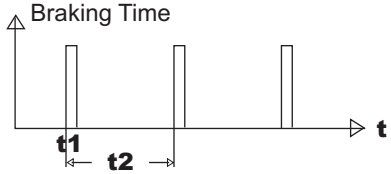
■Braking Unit Terminal Layout:



AC motor drive power KW	Braking Unit Model	The number of braking unit	Resistor disposition	Electronic quantity	Braking torque
0.4	DBU-4030	1	70W 750Ω	1	230
0.75	DBU-4030	1	70W 750Ω	1	130
1.5	DBU-4030	1	260W 400Ω	1	125
2.2	DBU-4030	1	260W 250Ω	1	135
3.7	DBU-4030	1	390W 150Ω	1	135
5.5	DBU-4030	1	520W 100Ω	1	135
7.5	DBU-4030	1	780W 75Ω	1	130
11	DBU-4030	1	1040W 50Ω	1	135
15	DBU-4030	1	1560W 40Ω	1	125
18.5	DBU-4030	1	4800W 32Ω	1	125
22	DBU-4030	1	4800W 27.2Ω	1	125
30	DBU-4030	1	6000W 20Ω	1	125
37	DBU-4045	1	9600W 16Ω	1	125
45	DBU-4045	1	9600W 13.6Ω	1	125
55	DBU-4030	2	6000W 20Ω	2	135
75	DBU-4045	2	9600W 13.6Ω	2	145
90	DBU-4045	2	9600W 10Ω	2	135
110	DBU-4030	3	9600W 20Ω	3	100
132	DBU-4030	3	9600W 16Ω	3	125
160	DBU-4020	1	40KW 3.4Ω	1	140
185	DBU-4020	1	50KW 3.3Ω	1	125

AC motor drive power KW	Braking Unit Model	The number of braking unit	Resistor disposition	Electronic quantity	Braking torque
220	DBU-4220	1	60KW 3.2Ω	1	110
250	DBU-4220	1	70KW 2.9Ω	1	110
315	DBU-4220	2	40KW 4.5Ω	2	110

■ED Brake Ratio



ED: Braking ratio, the ratio of braking time in a braking cycle. As shown in the figure above, it can be expressed as ED=t1/t2=10%, and Table 1 is the configuration table for this case.

Appendix B-4 EMI Filter

EMI Filter Specifications

Filter Model	Stabilized Current (40?)	Suited Capacity (KW)	Overall Size
ED 920—5 ED960—5	5A	0.75/1.5	N2
ED 920—8 ED960—8	8A	2.2/3.7	N2
ED 920—16 ED960—16	16A	5.5/7.5	N5
ED 920—30 ED960—30	30A	11/15	N5
ED 920—45 ED960—45	45A	18.5/22	N5
ED 920—75 ED960—75	75A	30/37	N12
ED 920—100 ED960—100	100A	45	N12
ED 920—120 Ed960—120	120A	55	N12
ED 920—150 Ed960—150	150A	75	N15
ED 920—200 Ed920—200	200A	90	N15
ED 920—300 Ed920—300	300A	150	N30
ED 920—420 Ed920—420	420A	210	N30
ED 920—500 Ed920—500	500A	260	N60
ED 920—600 Ed920—600	600A	315	N60

All electronic devices (AC motor drivers included) generate high frequency or low frequency noises during normal operation, and may interfere peripheral equipments through conduction or radiation. If they are equipped

with proper EMI filters and with correct installation, the interference can be restricted to the lowest. EACN EMI Filter is recommended, in order to exert maximum effect in restraining the interference of AC motor driver. Provided that the during the installation of AC motor driver and EMI filter, both setup and wiring comply with the content of the operation guide, we can be sure that it will come up to the following standards:

1. EN61000-6-4
2. EN61800-3: 1996
3. EN55011（1991） Class A Group 1

■Installation attentions

In order to make sure that EMI filter can exert maximum effect in restraining the interference of AC motor driver, AC motor driver should be installed and wired according to the content of the operation guide, and the following points also need your attention:

1.EMI filer and AC motor driver must be installed on the same metal board.

2.Try to install AC motor driver upon EMI filer.

3.Wiring should be as short as possible.

4.The metal board should be well grounded.

5.The metal cover or grounding of EMI filter and AC motor driver must be solidly fixed onto the metal board, and the contact area should be as large as possible.

■Motor Wire Select and Installation Attentions

Whether the selection and installation of motor wire is correct determines whether EMI filter can exert maximum effect in restraining the interference of AC motor driver. Please pay attention to the following:

1.Use cable wire with isolation copper mesh (better with double-layer isolation).

2.Copper mesh at both ends of the motor wire must be grounded with shortest distance and largest contact area.

3.Remove the protective paint where the U-shaped metal tubing bracket is fixed to the metal board in order to ensure good contact, as is shown in Figure 1.

4.The connection between the isolation copper mesh of the motor wire and the metal board should be correct, namely, the isolation copper mesh at both ends of the motor wire should be fixed to the metal board with the U-shaped metal tubing bracket.

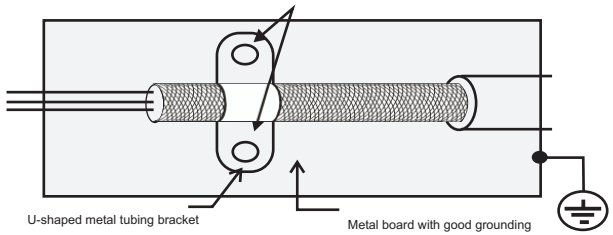


Figure 1

■Length of motor wire

If the motor is driven by a PWM AC motor driver, voltage surges are likely to occur on the terminals of the motor because of changes in AC motor driver components. If the motor wire is very long (especially for 440V series AC motor driver), surge voltage may reduce insulation capability. In order to avoid this, follow the following forms:

Use a motor with enhanced insulation and connect an output current filter (optional) to the output connector of the AC motor driver. Reduce the length of the wire between AC motor driver and the motor to shortest (10 to 20 meters or shorter).

AC motor driver ≥7.5HP

Motor Insulation Level	1000V	1300V	1600V
Input Voltage 400 VAC	66ft(20m)	328ft(100m)	1312ft(400m)
Input Voltage 230 VAC	1312ft(400m)	1312ft(400m)	1312ft(400m)

AC motor driver ≤5HP

Motor Insulation Level	1000V	1300V	1600V
Input Voltage 400 VAC	66ft(20m)	165ft(50m)	165ft(50m)
Input Voltage 230 VAC	328ft(100m)	328ft(100m)	328ft(100m)

If the motor is driven by a PWM AC motor driver, surge voltage generated by changes in AC motor driver components may added to the output voltage and may cause motor terminals to react. Especially when the wiring is too long, surge voltage may reduce insulation protection capability of the motor. Please consider the following measures:

■If the wiring is very long, stray capacitance among wires will increase and result in leakage current. This will start the overcurrent current display. increase the leakage current or harm the correctness of protection,The worst situation is that the driver may be burnt.

■If one driver connects more than one motor, the wiring length

should be the overall length of all the wiring to the motors.

■When driving a motor of 440V series, if a thermal relay is installed between the driver and the motor in order to protect the motor from overheat, the thermal relay may have malfunction, even if the wire is less than 50 meters. In this situation, an output current filter (optional) should be added or the carrier wave frequency should be decreased.

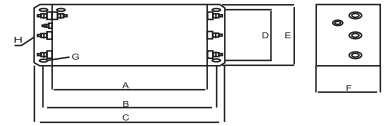
Notice!

1.When a thermal O/L relay is installed between the driver and the motor in order to protect the motor from overheat, the thermal relay may have malfunction (especially when using a 440V series driver), even the wire is only 165 feet (50 meters) or shorter. In order to avoid this situation, please add a filter or decrease the carrier wave frequency.

2.Please don't connect inlet phase capacitors or surge absorbers to the output connector of the driver.

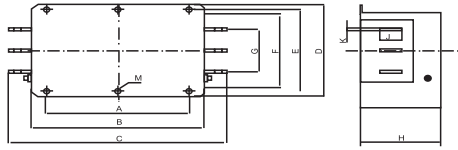
Size of EMI Filter

N2~N15



	A	B	C	D	E	F	G	H
N2	110	125+1.0	140	70+0.5	93	56	5.3+7	M4
N5	150	168+1.5	186	85+0.5	108	60	6.4+9	M6
N10	200	220+1.5	240	100+1.0	125	80	6.4+9	M6
N12	260	286+1.5	314	140+1.0	175	107	8.8+14	M8
N15	300	326+3.0	354	150+1.0	185	185	8.8+14	185

N30、N60

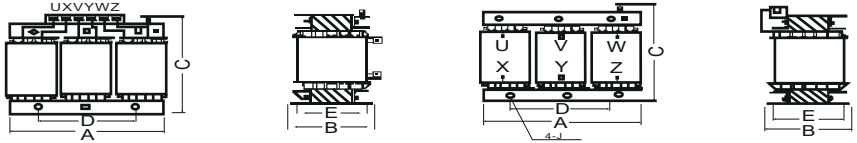


	A	B	C	D	E	F	G	H	J	K	M
N30	290+2.0	350	444	256	230+2.0	210	119	162	30	5.0	⌀12
N60	290+2.0	350	444	256	230+2.0	210	119	162	30	5.0	⌀12

Appendix B-5 Reactors

Input Reactor

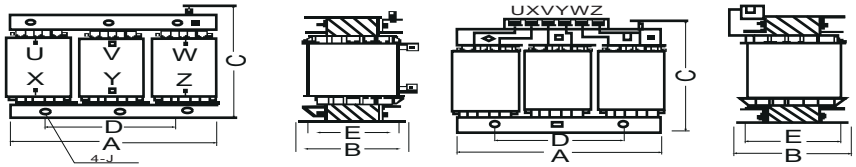
Sizes



Frequency converter Power KW	Rating Phase Current (A)	Equivalent Inductance (MH)	Sizes (mm) A	B	C	D	E	J
EDSK—0.75	2.5	8.4	130	90	130	80	70	7
EDSK—15	5	4.2	130	95	130	80	70	7
EDSK—22	7.5	2.8	130	100	130	80	70	7
EDSK—37	10	2.1	130	105	130	80	70	7
EDSK—55	15	1.4	160	1.0	135	80	72	7
EDSK—75	20	1.06	160	1.5	135	80	72	7
EDSK—11	30	0.71	170	120	175	100	75	7
EDSK—15	40	0.53	170	150	175	100	75	7
EDSK—18.5	50	0.42	170	150	175	100	75	7
EDSK—22	60	0.35	190	170	180	120	98	10
EDSK—30	76	0.276	230	175	215	120	1.0	10
EDSK—37	90	0.234	230	185]	215	120	1.0	10
EDSK—45	120	0.175	230	195	215	120	1.0	10
EDSK—55	150	0.14	230	205	215	120	1.5	10
EDSK—75	190	0.11	260	205	240	140	1.5	10
EDSK—90	210	0.10	260	2.0	240	140	1.5	10
EDSK—110	250	0.034	260	225	255	140	125	10
EDSK—132	290	0.073	320	235	270	150	120	10
EDSK—160	330	0.064	320	240	270	150	120	10
EDSK—185	400	0.048	320	250	270	150	150	10
EDSK—200	440	0.043	320	260	280	150	150	10
EDSK—220	490	0.039	320	260	290	150	150	10
EDSK—240	530	0.036	370	260	320	160	165	12
EDSK—280	600	0.032	370	270	330	160	185	12
EDSK—300	660	0.029	370	275	355	160	185	12
EDSK—315	700	0.027	385	285	355	200	185	16

Output Reactor

Sizes

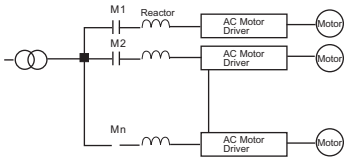


Frequency converter Power KW	Rating Phase Current (A)	Equivalent Inductance (MH)	Sizes 尺寸(mm) A	B	C	D	E	J
WDSK-0.75	25	4.7	130	90	130	80	70	7
WDSK-1.5	5	2.36	130	95	130	80	70	7
WDSK-2.2	7.5	1.57	130	100	130	80	70	7
WDSK-3.7	10	1.18	130	105	130	80	70	7
WDSK-5.5	15	0.8	160	110	135	80	72	7
WDSK-7.5	20	0.6	160	115	135	80	72	7
WDSK-11	30	0.4	160	120	135	80	72	7
WDSK-15	40	0.3	170	150	175	100	75	7
WDSK-18.5	50	0.24	170	160	175	100	75	7
WDSK-22	60	0.2	170	165	175	100	75	7
WDSK-30	76	0.155	230	175	215	120	110	10
WDSK-37	90	0.13	230	185	215	120	110	10
WDSK-45	120	0.1	230	195	215	120	110	10
WDSK-55	150	0.078	230	200	215	120	110	10
WDSK-75	190	0.062	260	205	245	140	115	10
WDSK-90	210	0.056	260	215	245	140	115	10
WDSK-110	250	0.047	260	225	245	140	115	10
WDSK-132	290	0.040	320	235	265	150	120	10
WDSK-160	330	0.036	320	240	265	150	120	10
WDSK-185	400	0.03	320	250	265	150	120	10
WDSK-200	440	0.027	320	250	265	150	150	10
WDSK-220	490	0.024	320	240	265	150	145	10
WDSK-240	530	0.022	370	245	320	160	165	12
WDSK-280	600	0.02	370	260	320	160	165	12
WDSK-300	660	0.018	370	265	320	160	177	12
WDSK-315	700	0.017	385	270	340	200	156	12

AC Reactor Application Example

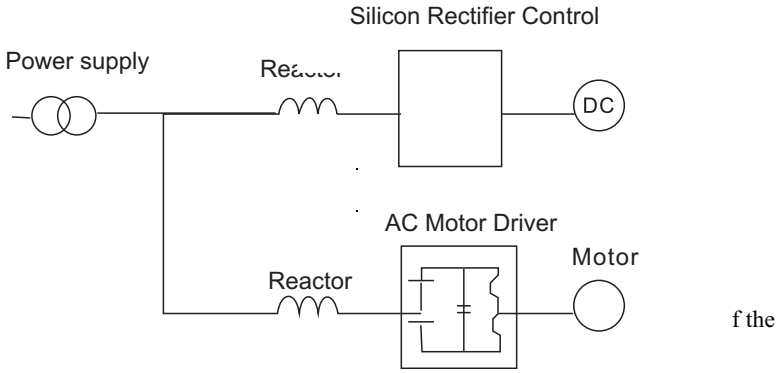
Service Condition 1	Reason / Concern
One power supply for several frequency converters, one frequency converter powers is turned on while others in operation.	In one power supply system, when the frequency converter's electromagnetic valve is turned on, charge current of the capacitors will cause voltage ripples, also, it will cause over-fluctuate of voltage on the DC side of other frequency converters.

Correct connection of reactors:



Service Condition 2	Reason / Concern
Silicon rectifier （such as DC motor driver） and frequency converter both connected to one power supply	Since the silicon rectifier is an ON/OFF element, a surge will be generated at the ON/OFF moment, and this surge may cause main circuit protection and damage.

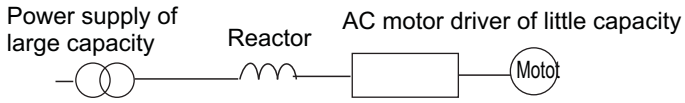
Correct connection of reactors:



f the

Service Condition 3	Reason / Concern
The capacity of the power supply is higher than ten times that of the frequency converter	In the situation where the power supply capacity is very high, the resistance of the power supply is small and thus the charge current is too high, so the rectifier o main circuit may overheat or be damaged.

Correct connection of reactors:



The choice of AC motor driver will affect its life period. If an AC motor driver of too high capacity is chosen, it cannot provide full protection for the motor, what's more, the motor may be burnt. If the chosen capacity is too low, it cannot come up to the requirements of the user's devices, and the AC motor driver may be burnt because of overload operation. However, just choose an AC motor driver with the same capacity to the motor may not completely satisfy the user's requirements. So, a fully considerate designer shall calculate the torque and wearing, and then choose the suitable motor and AC motor driver. Besides, he should know the user's habit, such as overload and overspeed operation.

Items		Relevant Factors			
		Speed Torque Features	Time Specifi-cations	Overload Tolerance	Start Torque
Load Type	Friction load, gravity load, fluid (viscidity) load, inertia load, energy transfer/storage load	●			●
Load SpeedTorque Features	Fixed torque and fixed output Descending torque and descending output	●	●		
Load Nature	Fixed load, impact load, repeated load,high start torque load, low start torque load	●	●	●	●
Way of Operation	Continuous operation, middle/low speed long time operation, short time operaion		●	●	
Rating Output	Instantaneous highest output, constant rating output	●		●	
Rating Speed	Highest speed, rating speed	●			

Items		Relevant Factors			
		Speed Torque Features	Time Specifi-cations	Overload Tolerance	Start Torque
Power Supply	Power supply transformer capacity, percent impedance, voltage range, number of phases, whether open phase, power frequency			●	●
Load Capacity Changes	Mechanical devices wearing, piping system wearing			●	●
	Operation Duty Cycle alternation		●		

Appendix C-1 Calculation Formulas of AC Motor Driver Capacity

Calculation Formulas of AC Motor Driver Capacity

Does the start capacity exceed the rating capacity of the AC motor driver?

Calculating method

1. Motor driver drives one motor

$$\frac{KXN}{973X? Xcosf}\left(T_L+\frac{GD^2}{375}X\frac{N}{T_A}\right) \leqq 1.5X \text{ Capacity of AC motor driver KVA}$$

2. One AC motor driver drives multiple motors

Does the start capacity exceed the rating capacity of the AC motor driver?

Calculating method: acceleration time ≦ 60seconds

$$\frac{K_X N}{\prod_X cosf}\{n_T+n_S(K_S-1)\}=P_{C1}\{1+\frac{n_S}{n_T}(K_S-1)\} \leqq 1.5X \text{ Capacity of AC motor driver KVA}$$

Calculating method: acceleration time ≧ 60seconds

$$\frac{K_X N}{\prod_X cosf}\{n_T+n_S(K_S-1)\}=P_{C1}\{1+\frac{n_S}{n_T}(K_S-1)\} \leqq \text{ Capacity of AC motor driver KVA}$$

Does the current exceed the rating current of the AC motor driver?

Calculating method: acceleration time ≦ 60seconds

$$n_T+I_m\ \{1+\frac{n_S}{n_T}(K_S-1)\} \leqq 1.5X \text{ Capacity of AC motor driver A}$$

Calculating method: acceleration time ≧ 60seconds

$$n_T+I_m\ \{1+\frac{n_S}{n_T}(K_S-1)\} \leqq \text{ Capacity of AC motor driver A}$$

During continuous operation

Does the capacity needed by the load exceed the capacity of the AC motor driver?

Calculating method:

$$\frac{KxP_M}{nx\cos f} \leqq \text{ Capacity of AC motor driver KVA}$$

Does the capacity of the motor exceed the capacity of the AC motor driver?

$$K\ X\ \sqrt{3}\ X\ V_M X\ I_M X\ 10^{-3} \leqq \text{ Capacity of AC motor driver KVA}$$

Does the current exceed the rating current of the AC motor driver?

$$K\ X I_M \leqq A$$

Complement Descriptions

P_M: Motor shaft output needed by load (kW)

$\prod$: Motor efficiency (usually about 0.85)

cos ϕ : Motor power (usually about 0.75)

V_M: Motor voltage (V)

I_M : Motor current (A), while commercial power in use

k : Motor waveform augmenting factor (about 1.05~1.1 in PWM mode)

P_{c1} : Constant capacity (kVA)

k_S : Motor start current / Motor rating current

n_T : Number of motors parallel connected

n_S : Number of motors start together

Gd_2 : Motor shaft inertia

T_L: Load torque

t_A : Motor acceleration time

N : Motor rotation speed

Appendix C-2 Attentions in Choosing AC Motor Drivers

1. When high capacity transformer (600kVA or higher) or inlet phase capacitor are used, surge current on the power input side may be too large and may damage the input side of the AC motor driver. In this situation, an AC reactor should be installed on the input side in order to decrease the current as well as improve input power.

2. When driving special motors or one AC motor driver driving multiple motors, 1.25 times of overall rating current of all motors must not exceed the rating current of the AC motor driver, and the choice of AC motor driver must be very cautious.

3. When AC motor driver drives motors, the start, acceleration and deceleration features are restrained by the rating current of the AC motor driver, and the start torque is relatively small (commercial power supply can provide a 6-time start current in direct start, while the current must not exceed 2 times when AC motor driver starts). So in circumstances where high start torque is needed (such as elevators, blenders, machine tools, etc.), an AC motor driver one or two levels higher in capacity has to be used, and the best way is to use one level higher motor and AC motor driver together.

4. It has to be taken into consideration that once AC motor driver fails and stops output, how shall the motor and mechanical devices stop. If emergency stop is needed, external mechanical braking equipment is needed.

Attentions in Parameters Setting

1. Since the digital operator can set speed to as high as 400Hz, when used in circumstances with highest speed limit, the speed upper limit function can be used to restrain output frequency.

2. If DC braking voltage and braking time are set too high, it may cause overheat of the motor.

3. Acceleration/deceleration time of the motor is determined by motor rating torque, torque needed by load and load inertia.

4.If stall-proof during acceleration/deceleration occurs, please lengthen the acceleration/deceleration time. If acceleration/deceleration must be fast and load inertia is large so that AC motor driver cannot accelerate or stop the motor in needed time, it'll be a must to add a braking resistor (can only shorten deceleration time) or use motor and AC motor driver of a higher level.

Appendix C-3 Choosing Motors

Standard Motors

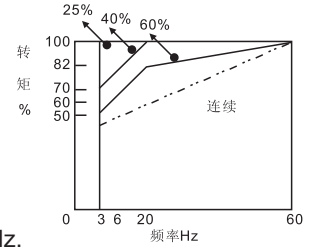
When AC motor driver drives standard motors (three-phase induction motors), pay attention to the following:

1. When driving standard motors with AC motor drivers, the energy loss is higher than driving with commercial power supplies.

2. When standard motors operate at low speed, they may heat up due to low speed of the cooling fans. So avoid long time low-speed operation.

3. When standard motors operate at low speed, the output torque is decreased, so please decrease the load.

4. The figure below is the characteristic diagram of admissible load.



5. If 100% torque output is needed in low-speed operation, separately cooled specialized motors for AC motor driver are needed.

6. Rating speed of standard motors is 60Hz. When this speed is exceeded, the dynamic balance of the motor and durability of the rotor must be taken into consideration.

7. Motor torque features when driven by AC motor drivers are different from that directly driven by commercial power supply, see motor torque features on next page.

8. AC motor driver controls with high carrier wave PWM modulation, please pay attention to the following problems with motor vibration:

Mechanical Resonance: Especially for the mechanical devices which often operate at variable speed, please install vibration-proof rubber.

Motor Imbalance: Especially with high speed operation of 60Hz and higher.

9. When the motor operates at high speed (higher than 60Hz), the noise of the cooling fan becomes significant.

Special Motors

1. Variable Pole Motors: The rating current of variable pole motors is different from standard motors, please confirm it and carefully choose the capacity of the AC motor drivers. The motors must be stopped while changing poles. When overcurrent occurs or regenerative voltage is too high, leave the motors to free operate and automatically stop.

2. Submersible Motors: Rating current is higher than standard motors, please confirm it and carefully choose the capacity of the AC motor drivers. If the wiring between AC motor driver and the motor is too long, it may decrease motor torque.

3. Explosion-proof Motors: When using explosion-proof motors, notice that the AC motor driver itself is not an explosion-proof device and has to be installed at a safe location, and the installation of wiring must go under explosion-proof inspection.

4. Reducing Motors: Lubrication of reducing gear and constant operation speed range vary according to factories and brands. Lubricating functions must be taken into consideration during long time operation at low speed, and gear lubrication tolerance must be considered during high speed operation.

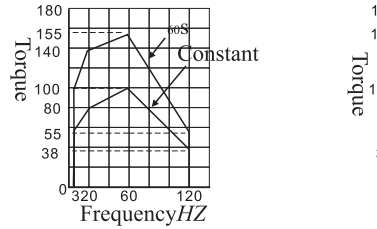
5. Synchronous Motors: Rating current and start current are higher than standard motors, please carefully choose the capacity of the AC motor drivers. When one AC motor driver drives multiple motors, pay attention to problems of start and motor alternation.

Gearing

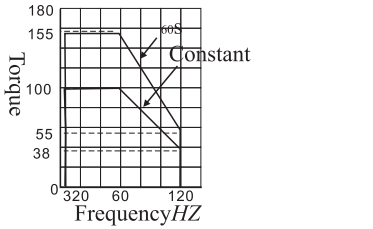
When using gearing devices such as speed reducers, belts and chains, pay attention to the degeneration of lubricating functions during low-speed operation and noise, life, center of gravity, strength and vibrations of the gearing devices during high-speed operation above 60Hz

Motor Torque Output Features

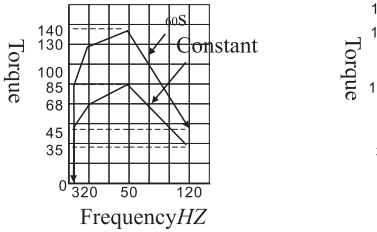
When driven by AC motor drivers, motor torque features are different from driven directly by commercial power supplies. The figures below are motor torque-speed characteristics graphs of standard motor driven by AC motor driver (4 poles, 15kW motor).



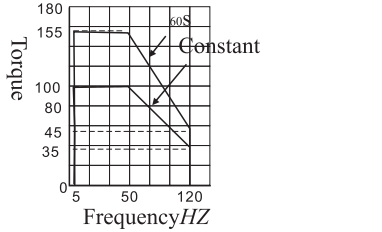
Basic frequency60 Hz (for V/F: 60Hz)
(Voltage:200V)



Basic frequency60 Hz (for V/F: 60Hz)
(Voltage:200V)



Basic frequency50 Hz (for V/F: 50H
(Voltage:200V)



Basic frequency50 Hz (for V/F: 50Hz)
(Voltage:200V)

Appendix C-4 Causes and Solutions of AC Motor Driver Faults

Malfunction or fault can be caused by reasons such as way of operation, setting conditions, environment or the AC motor driver itself. If these causes are not eliminated or no measures are taken, the device will end up unable to operate normally.

(1) Measures against electromagnet noises and induction noises

If there's noise source near the AC motor driver, the noise may invade the AC motor driver through radiation or power line and cause faulty actions of control circuit, and even destroy AC motor driver. Naturally, one solution is to improve noise tolerance of AC motor driver, but that's not economic, let alone the limited range of improvement. So it's best to take measures outside it to avoid the interference.

1. Install surge killer on relay or contactor in order to restrain switching surge noises at on and off switching.

2. Try to shorten the wiring of control circuit or program control circuit, and separate it from main circuit wiring.

3. For circuits regulated to use shielded wire for wiring, wiring must comply with the wiring regulations. And if the wiring is too long, an isolation amplifier should be added.

4.The grounding terminal of AC motor driver should be grounded according to regulations, and the grounding should be separate and not shared with electric welding machine or power devices.

5. Add a noise filter on the input terminal of the AC motor driver to avoid noise invasion from the power line.

(2) Environment setup measures

AC motor driver is a device made up of electronic parts, and its admissible environment is described in the specifications in detail. If the regulations cannot be followed, corresponding measures or solutions must be taken.

1. Avoid vibrations, and use vibration-proof pads when necessary. Make sure that the vibration is under regulation. Since the effect of vibration on electronic parts equals to mechanical stress, it should not be taken for long or repeatedly, which may cause faults in the device.

2.Avoid corrosive gases and dusty environment, both of which will cause electronic parts rust and bad contact, and what's more, insulation will be decreased due to moisture absorption and cause short circuit accidents. Regular measure is treating

3.with paint and dust-proof, and in strict conditions, inner-pressure suited for clean air or self-protective whole sealing structures are adopted.Environmental temperature should be appropriate, the life-span and reliability of electronic parts is affected by both too high and too low temperature. Take semiconductor module for example, once the regulated limit is exceeded, damage will be instant. As a result, except equipping with cooler and sun-shade to keep the temperature in the regulated range, cleaning and spot check on air filter in the AC motor driver rack and the angles of cooling fan are also necessary. Besides, the internal microprocessor may stop working under extremely low temperature, space heaters must be equipped in low temperature areas.

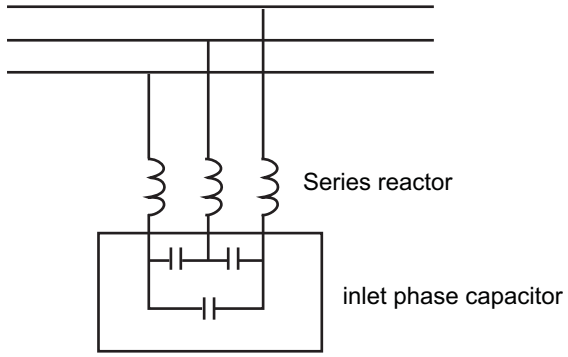
4.No damp, and never should dewing occur. When AC motor driver needs to be left unused for a long time, be cautious that dewing may occur as soon as air-conditioning is stopped. It would be best that the cooling device of the electric room has dehumidification function.

(3)Prevent AC motor driver from interfering other machines

It is common that an AC motor driver interferes other machines at the same site, and this should be avoided through taking measures or solutions beforehand

Higher Harmonics Generated on Mains Side

During the operation of AC motor driver, higher harmonics are generated and flow towards the power supply, affecting the system adversely. Measures to be taken are as follows:



1.Isolate the power supply system, and set specialized transformer to transfer current to AC motor driver.

2.Plug a reactor on the AC motor driver side or introduce multiple current transforming in order to reduce the higher harmonics composition. As is shown in the figure:

3.If there's an inlet phase capacitor, a reactor should be cascaded in order to prevent too large higher harmonic current from flowing into it and destroy the capacitor by causing overheat.

Temperature Raise of the Motor

When the motor is used for variable speed operation, if it is synchronously ventilated induction motor, cooling effect is poor during low-speed operation and overheat may occur. Besides, AC motor driver's output wave contains higher harmonics, so both copper loss and iron loss increase. Reference data should be prepared according to load status and operation range, and the following measures should be taken when necessary:

1.Replace the motor with separate power ventilated model or use one level higher.

2.Use AC motor driver model motor instead to match AC motor driver.

3.Restrict the operation range and avoid operation in the low-speed zone.